FIG. 1

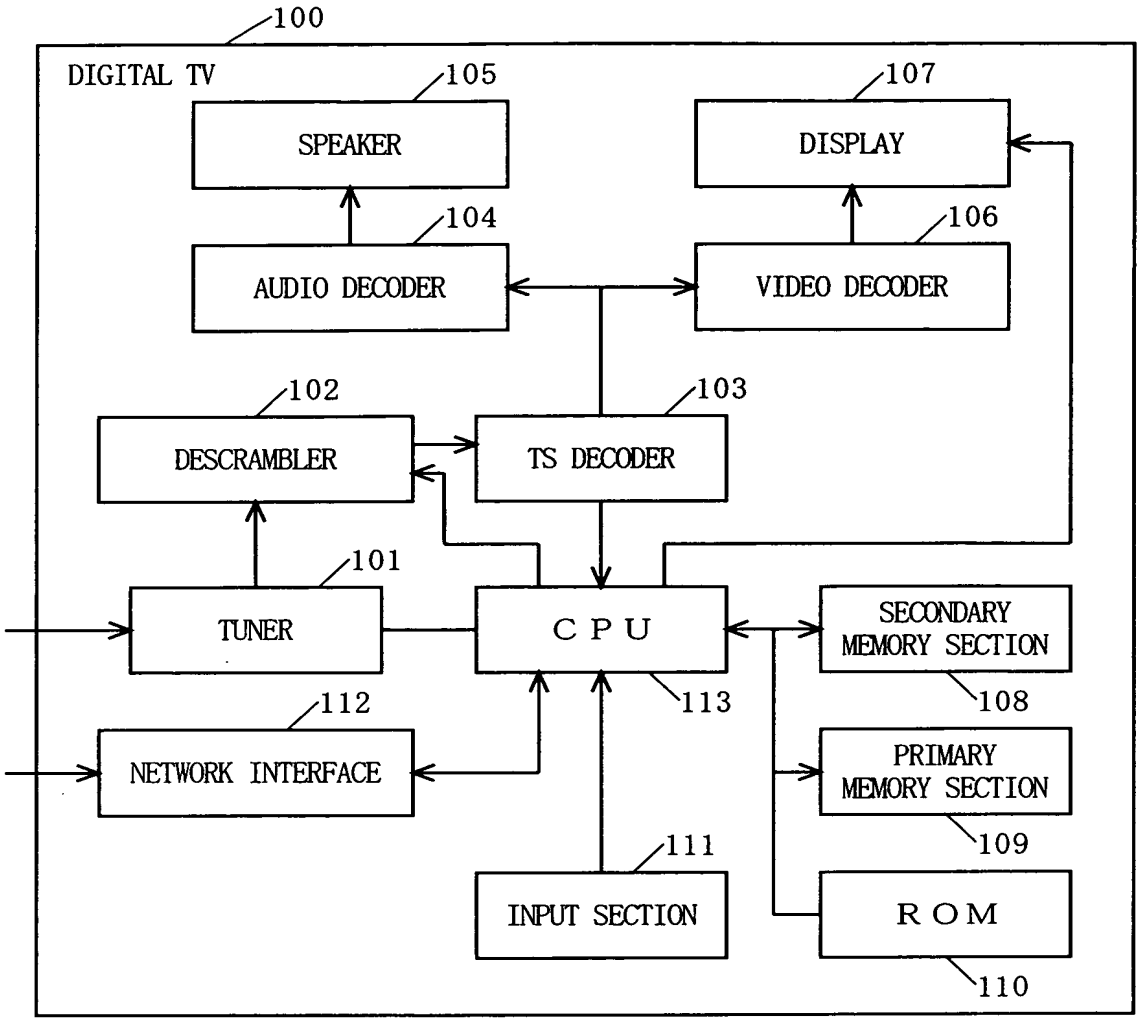
100
DIGITAL TV
105
SPEAKER
107
DISPLAY
104
AUDIO DECODER
106
VIDEO DECODER
102
DESCRAMBLER
103
TS DECODER
101
TUNER
C P U
SECONDARY MEMORY SECTION
108
112
NETWORK INTERFACE
113
PRIMARY MEMORY SECTION
109
111
INPUT SECTION
R O M
110

FIG. 2

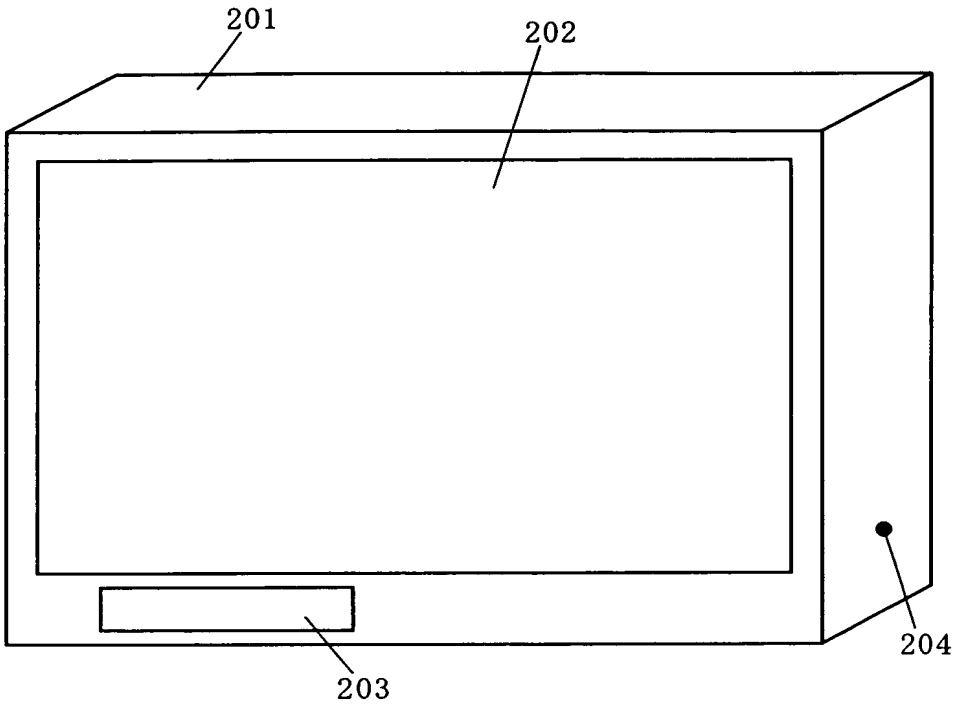
201
202
203
204

FIG. 3

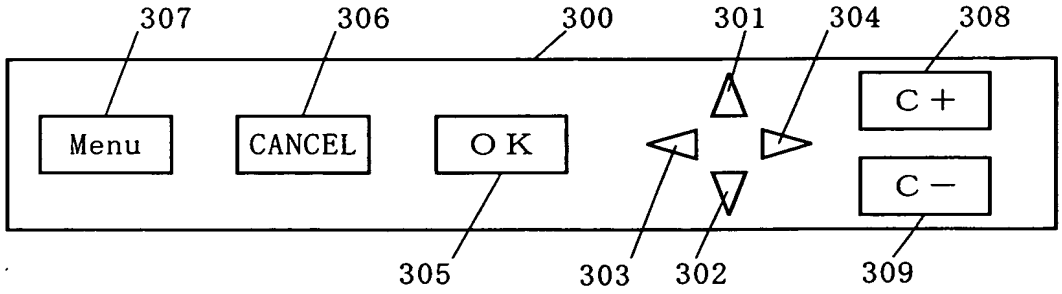
307
306
300
301
304
308
Menu
CANCEL
OK
C+
C−
305
303
302
309

FIG. 4

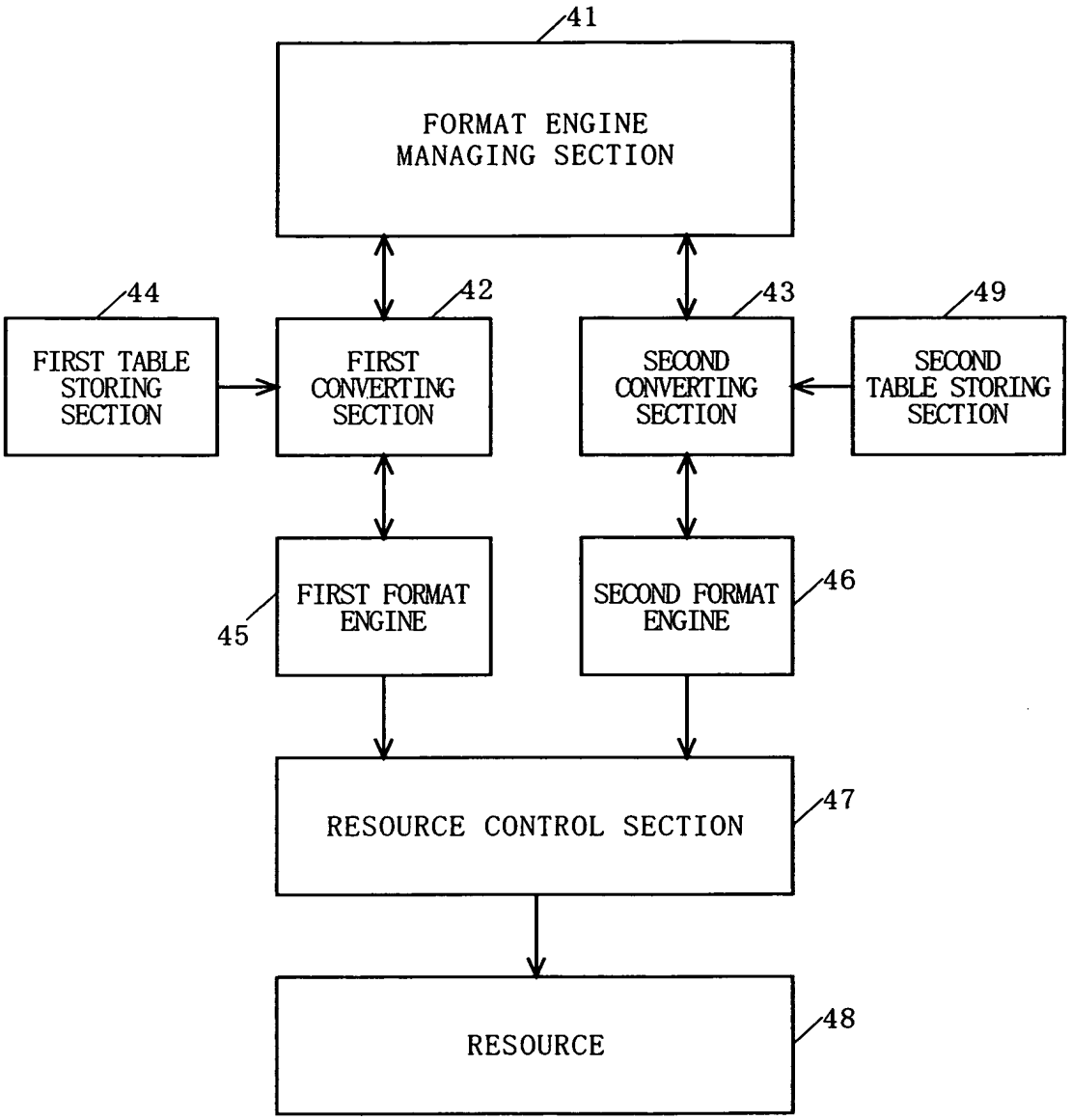
41
FORMAT ENGINE MANAGING SECTION
44
42
43
49
FIRST TABLE STORING SECTION
FIRST CONVERTING SECTION
SECOND CONVERTING SECTION
SECOND TABLE STORING SECTION
45
FIRST FORMAT ENGINE
SECOND FORMAT ENGINE
46
RESOURCE CONTROL SECTION
47
RESOURCE
48

FIG. 5

(a)

COMMON STATE	INDIVIDUAL STATE OF THE FIRST FORMAT ENGINE
DURING EXECUTION	IN OPERATION
TERMINATED	AT A STOP
	AT A PAUSE

(b)

COMMON STATE	INDIVIDUAL STATE OF THE SECOND FORMAT ENGINE
DURING EXECUTION	ACTIVE
TERMINATED	NON-ACTIVE

FIG. 6

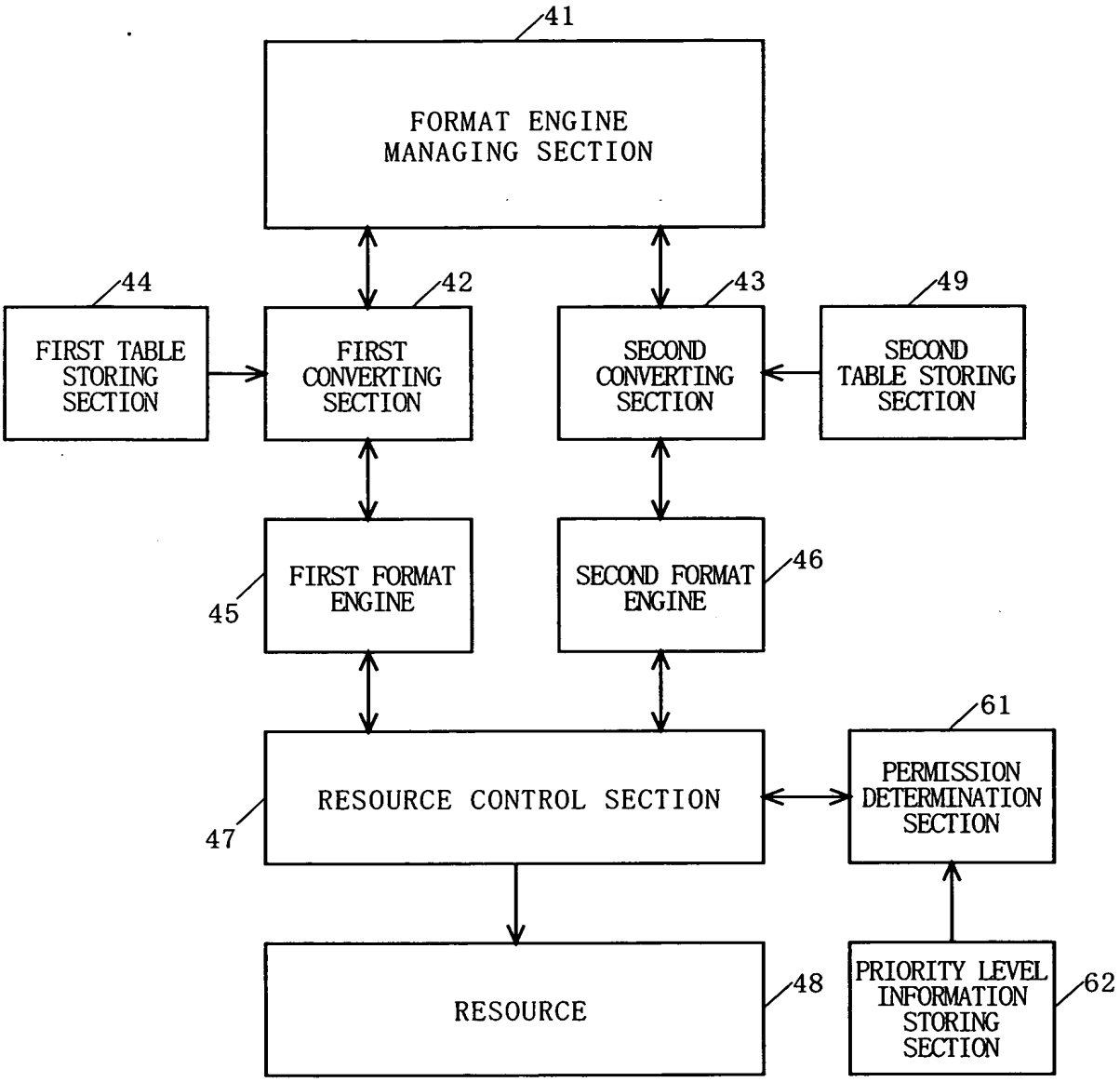
41
FORMAT ENGINE MANAGING SECTION
44
FIRST TABLE STORING SECTION
42
FIRST CONVERTING SECTION
43
SECOND CONVERTING SECTION
49
SECOND TABLE STORING SECTION
45
FIRST FORMAT ENGINE
SECOND FORMAT ENGINE
46
61
RESOURCE CONTROL SECTION
PERMISSION DETERMINATION SECTION
47
RESOURCE
48
PRIORITY LEVEL INFORMATION STORING SECTION
62

FIG. 7

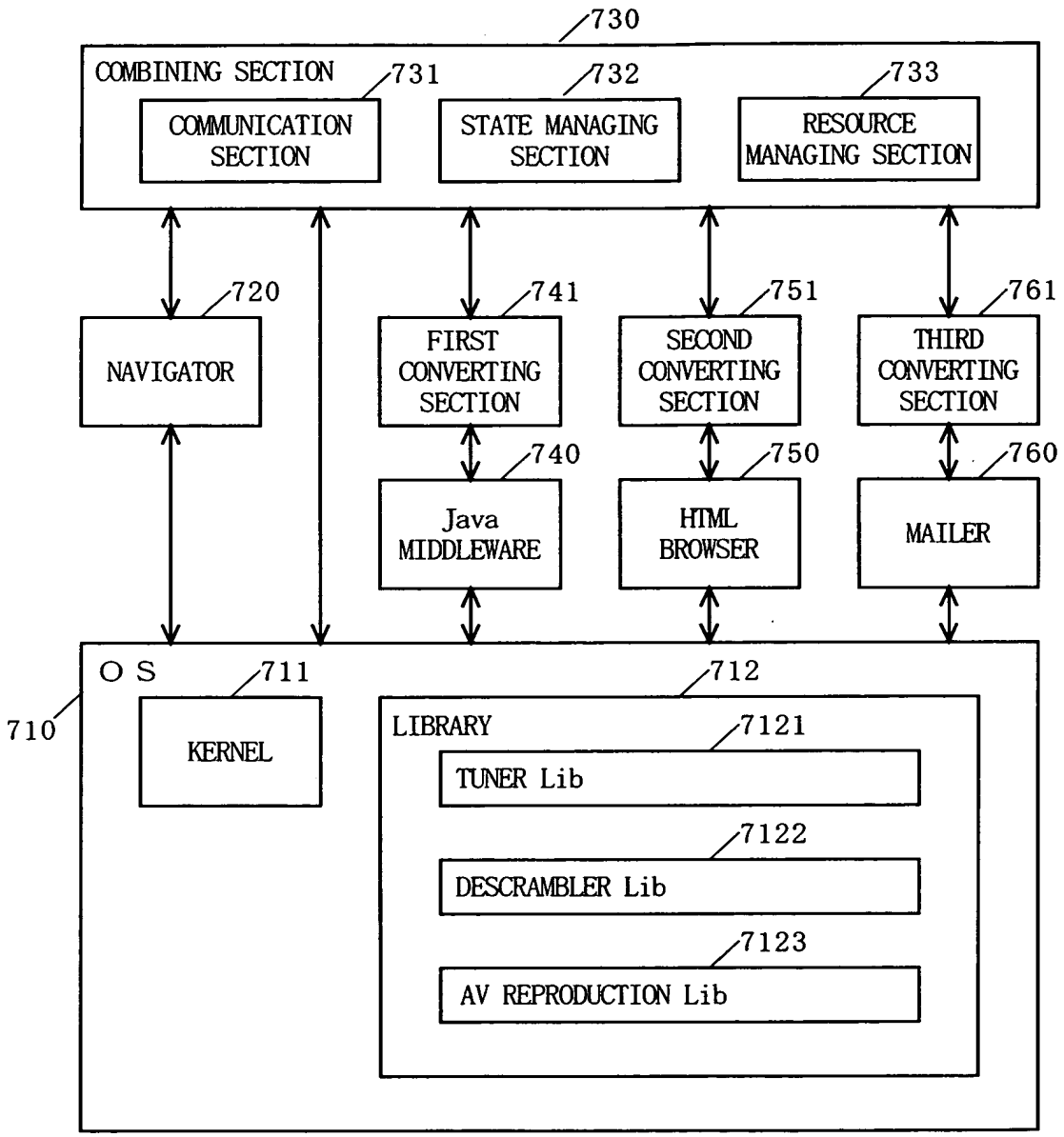
730
COMBINING SECTION
731
732
733
COMMUNICATION SECTION
STATE MANAGING SECTION
RESOURCE MANAGING SECTION
720
741
751
761
NAVIGATOR
FIRST CONVERTING SECTION
SECOND CONVERTING SECTION
THIRD CONVERTING SECTION
740
750
760
Java MIDDLEWARE
HTML BROWSER
MAILER
O S
711
712
710
KERNEL
LIBRARY
7121
TUNER Lib
7122
DESCRAMBLER Lib
7123
AV REPRODUCTION Lib

FIG. 8

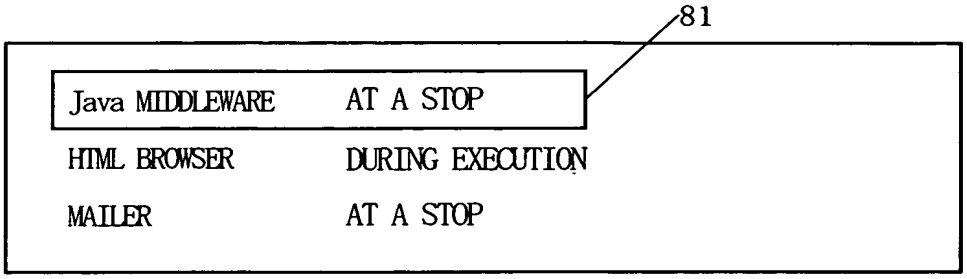

FIG. 9

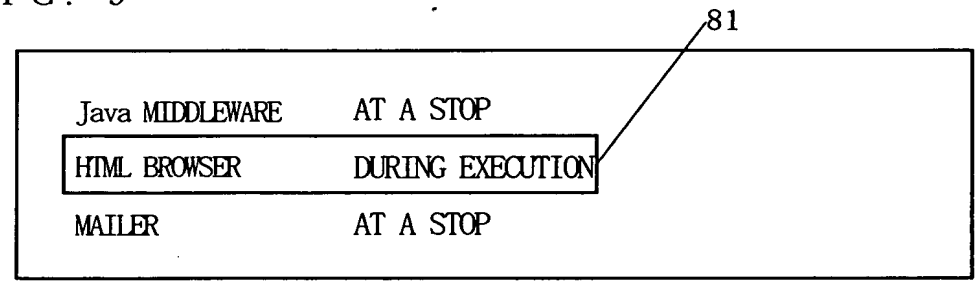

FIG. 10

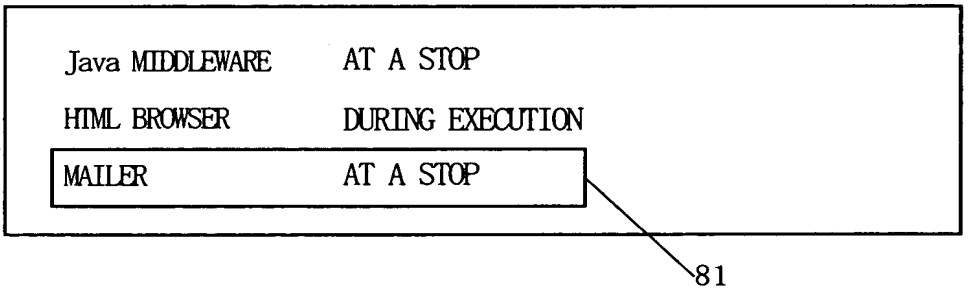

FIG. 11

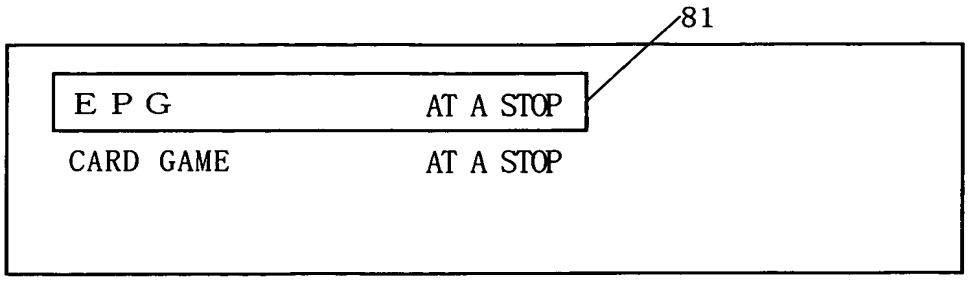

FIG. 12

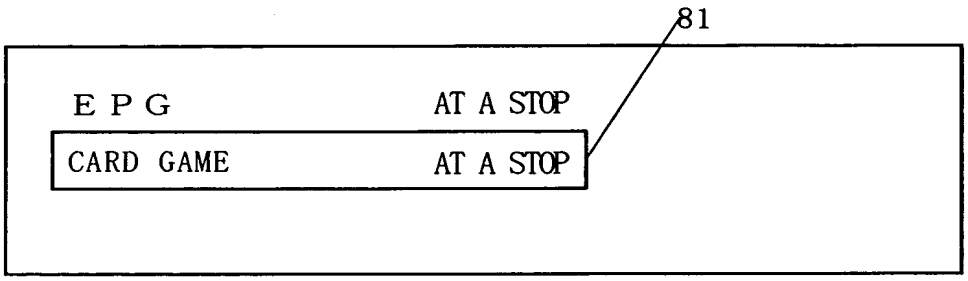

FIG. 13

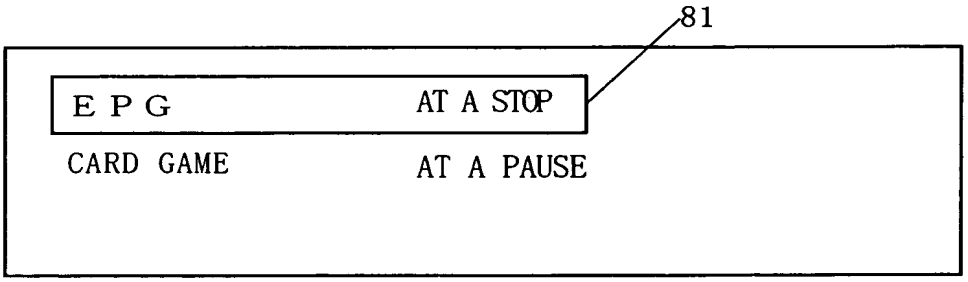

FIG. 14

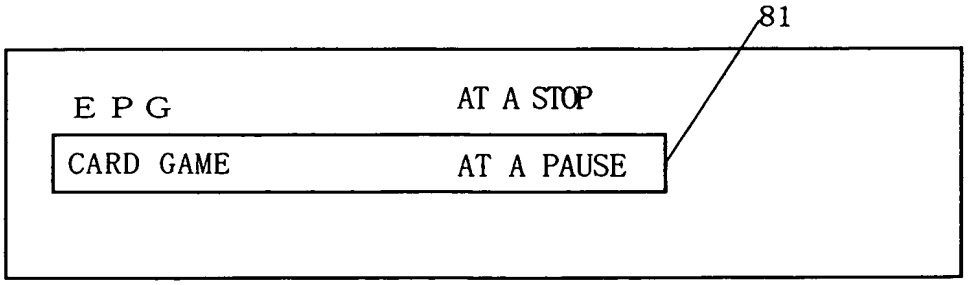

FIG. 15

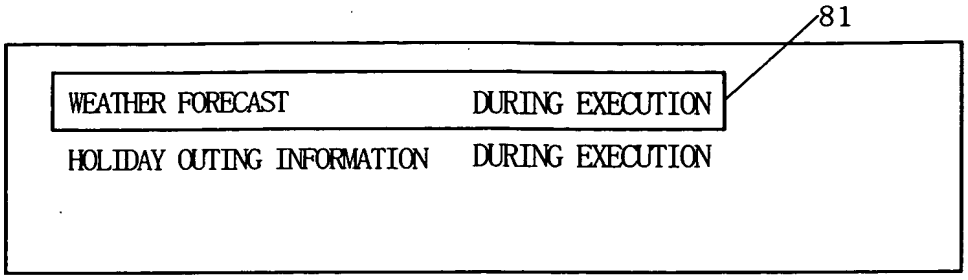
81
WEATHER FORECAST DURING EXECUTION
HOLIDAY OUTING INFORMATION DURING EXECUTION

FIG. 16

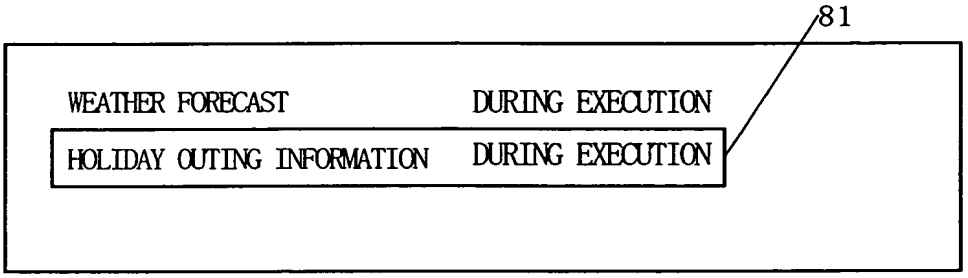
81
WEATHER FORECAST DURING EXECUTION
HOLIDAY OUTING INFORMATION DURING EXECUTION

FIG. 17

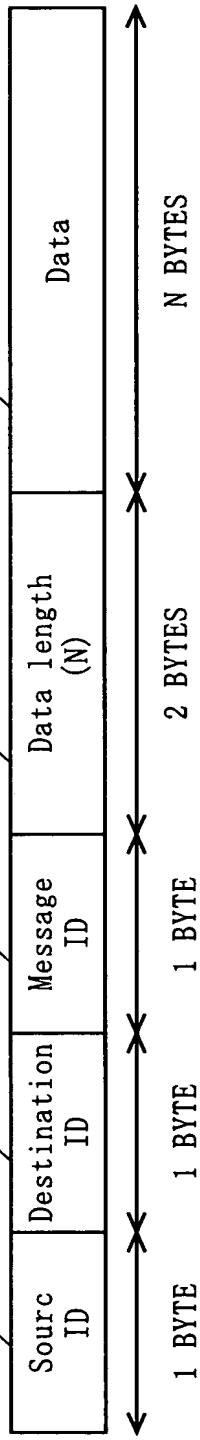
171
Sourc ID
1 BYTE
172
Destination ID
1 BYTE
173
Message ID
1 BYTE
174
Data length (N)
2 BYTES
175
Data
N BYTES

FIG. 18

SUB PROGRAM	SID
ALL	0
NAVIGATOR	1
Java MIDDLEWARE	2
HTML BROWSER	3
MAILER	4
COMBINING SECTION	5

FIG. 19

MESSAGE	MID	FORMAT ID
FORMAT ENGINE STATE REQUEST	1	NOT AVAILABLE
FORMAT ENGINE STATE RESPONSE	2	F01
FORMAT ENGINE STATE CHANGED	3	NOT AVAILABLE
EXECUTE FORMAT ENGINE	4	NOT AVAILABLE
TERMINATE FORMAT ENGINE	5	NOT AVAILABLE
PAUSE FORMAT ENGINE	6	NOT AVAILABLE
APPLICATION/DATA LIST REQUEST	11	NOT AVAILABLE
APPLICATION/DATA LIST RESPONSE	12	F02
APPLICATION/DATA LIST CHANGED	13	NOT AVAILABLE
EXECUTE APPLICATION/DATA	14	F03
TERMINATE APPLICATION/DATA	15	F03
PAUSE APPLICATION/DATA	16	F03
PRIVATE	21	—

FIG. 20

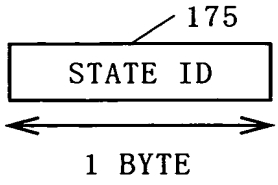

FIG. 21

STATE NAME	MEANING	OPERATING STATE ID
DURING EXECUTION	USING A MINIMUM RESOURCE	1
AT A PAUSE	USING SHARABLE RESOURCE	2
AT A STOP	NOT USING A RESOURCE	3

FIG. 22

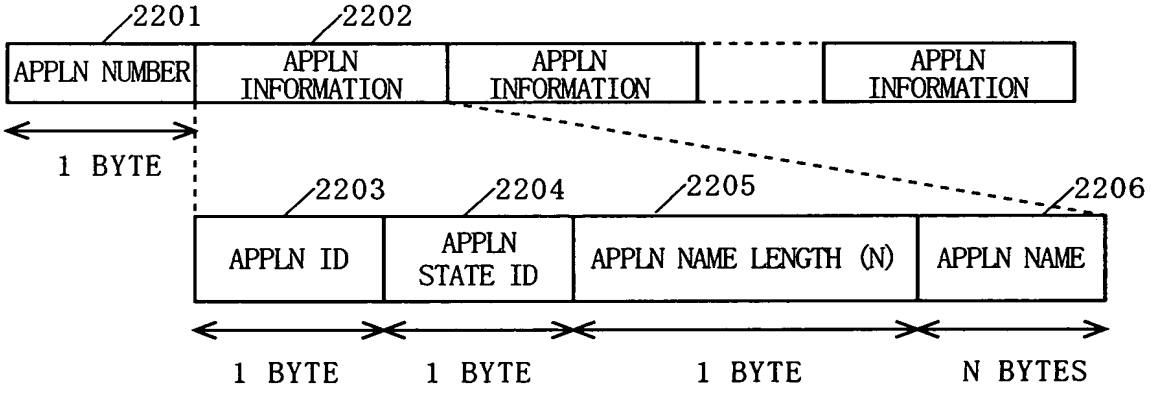

FIG. 23

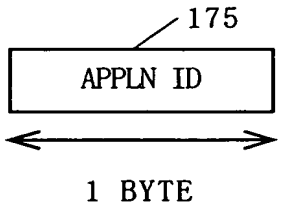

FIG. 24

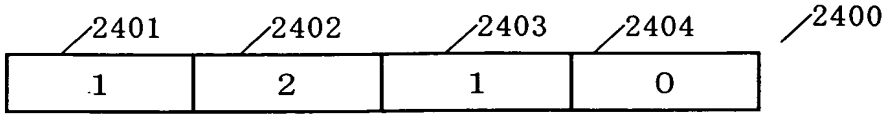

FIG. 25

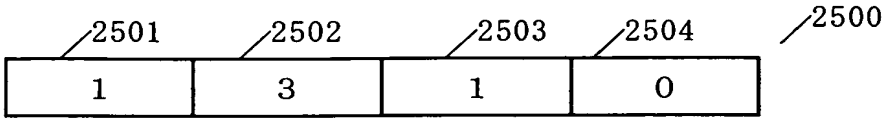

FIG. 26

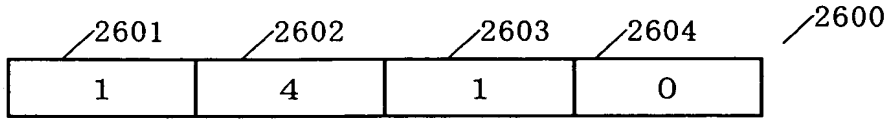

FIG. 27

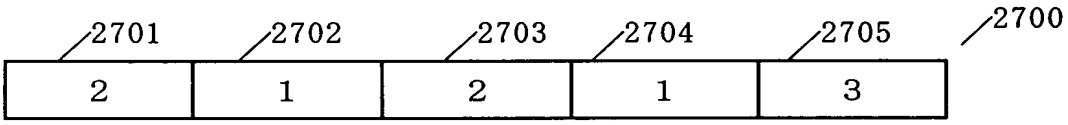

FIG. 28

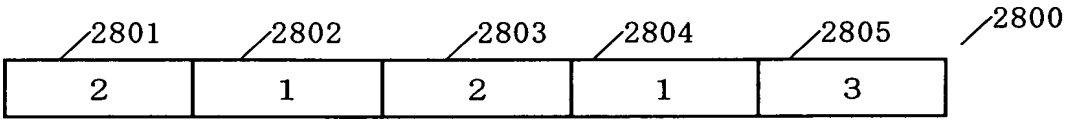

FIG. 29

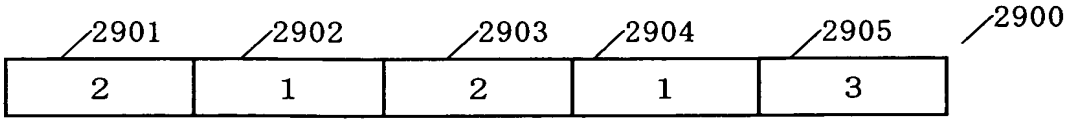

FIG. 30

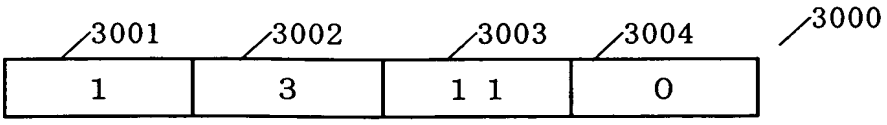

FIG. 31

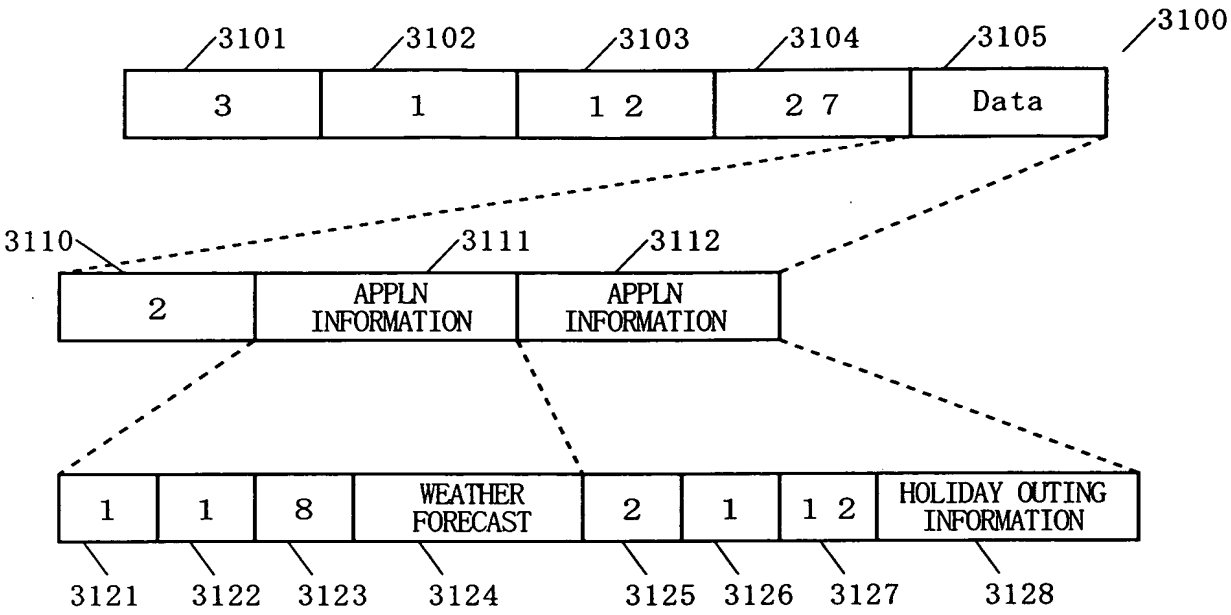
3100
3101
3102
3103
3104
3105
3
1
1 2
2 7
Data
3110
3111
3112
2
APPLN INFORMATION
APPLN INFORMATION
1
1
8
WEATHER FORECAST
2
1
1 2
HOLIDAY OUTING INFORMATION
3121
3122
3123
3124
3125
3126
3127
3128

FIG. 32

FID	FORMAT ENGINE NAME	STATE ID	APPLN INFORMATION
2	Java MIDDLEWARE	3	0x5678
3	HTML BROWSER	3	0x7162
4	MAILER	3	NULL

FIG. 33

AID	APPLN NAME	STATE ID
1	EPG	3
2	CARD GAME	3

FIG. 34

DATA ID	APPLN NAME	STATE ID
1	WEATHER FORECAST	1
2	HOLIDAY OUTING INFORMATION	1

FIG. 35

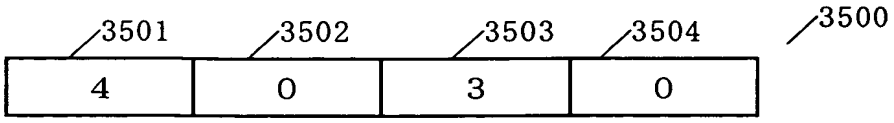

FIG. 36

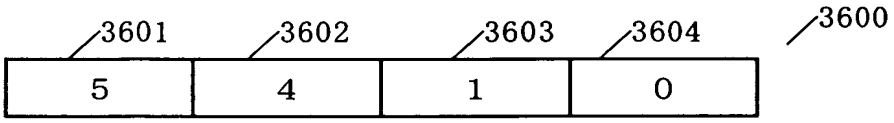

FIG. 37

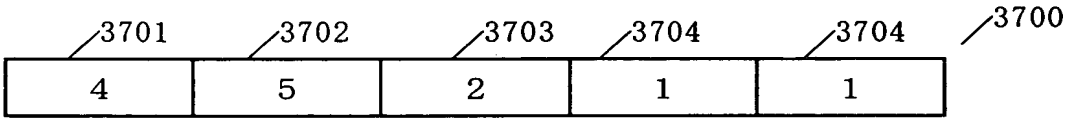

FIG. 38

FID	FORMAT ENGINE NAME	STATE ID	APPLN INFORMATION
2	Java MIDDLEWARE	3	0x5678
3	HTML BROWSER	3	0x7162
4	MAILER	1	NULL

FIG. 39

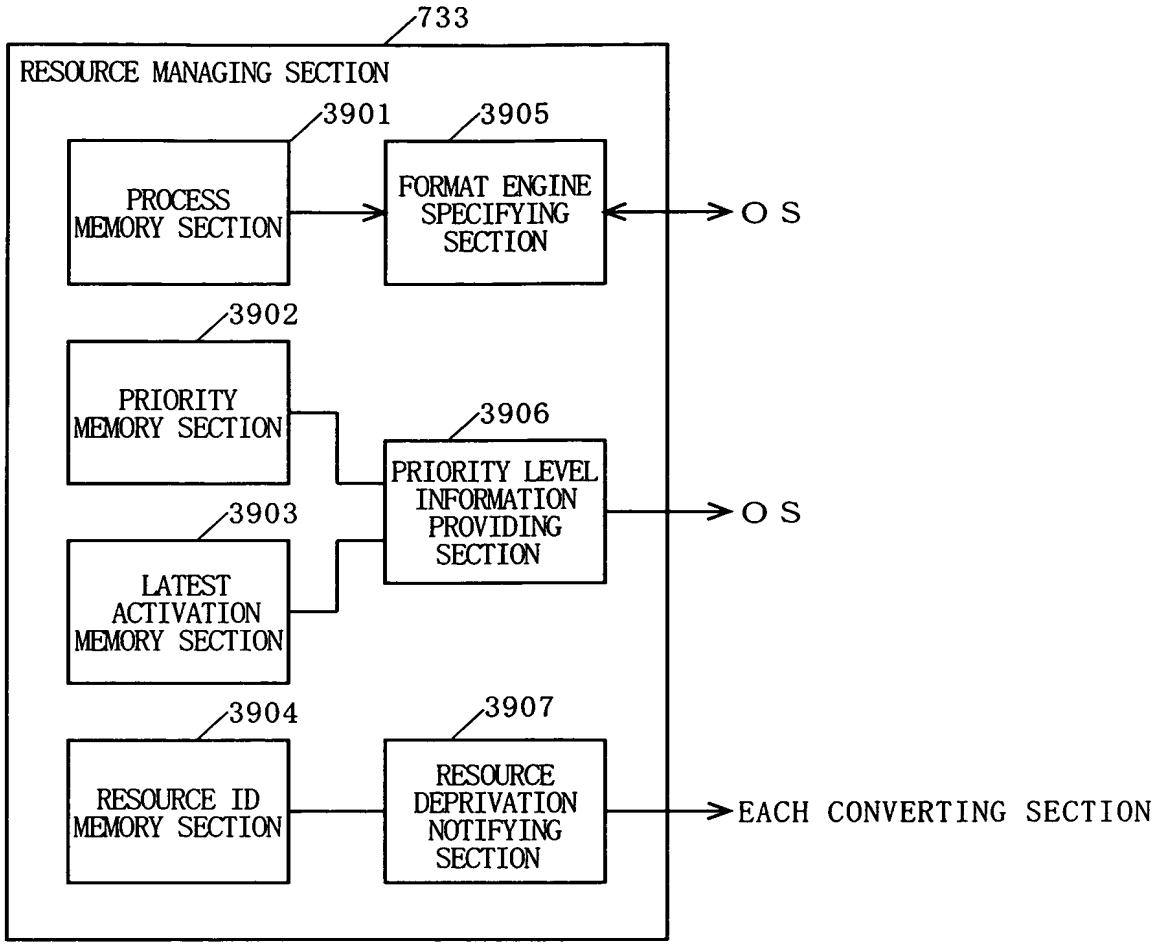
733
RESOURCE MANAGING SECTION
3901
PROCESS MEMORY SECTION
3905
FORMAT ENGINE SPECIFYING SECTION
OS
3902
PRIORITY MEMORY SECTION
3906
PRIORITY LEVEL INFORMATION PROVIDING SECTION
OS
3903
LATEST ACTIVATION MEMORY SECTION
3904
RESOURCE ID MEMORY SECTION
3907
RESOURCE DEPRIVATION NOTIFYING SECTION
EACH CONVERTING SECTION

FIG. 40

FID	PROCESS ID
2	100
3	110
4	120

FIG. 41

FID	PRIORITY LEVEL
2	2
3	1
4	3

FIG. 42

4

FIG. 43

RID	RESOURCE
1	TUNER
2	TS DECODER
3	AUDIO DECODER
4	VIDEO DECODER
5	NETWORK INTERFACE

FIG. 44

```
#define RESOURCE_ID_TUNER              1
#define RESOURCE_ID_TSDECODER          2
#define RESOURCE_ID_AUDIODECODER       3
#define RESOURCE_ID_VIDEODECODER       4
#define RESOURCE_ID_NETWORK            5
```

FIG. 45

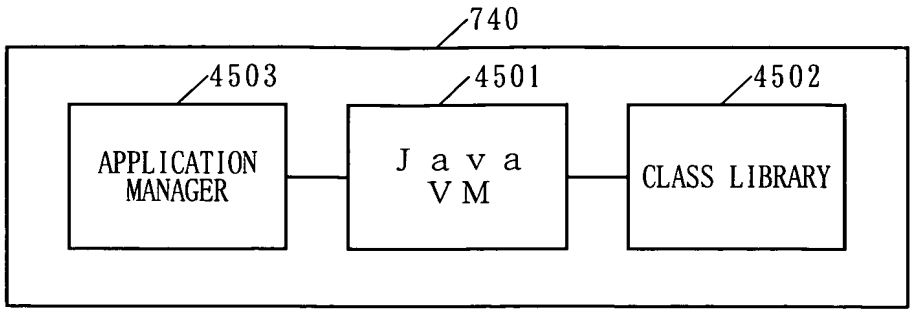

FIG. 46

AID	CONTROL INFORMATION	APPLN NAME	APPLN PRIORITY LEVEL
1	autostart	EPG	64
2	present	CARD GAME	32

FIG. 47

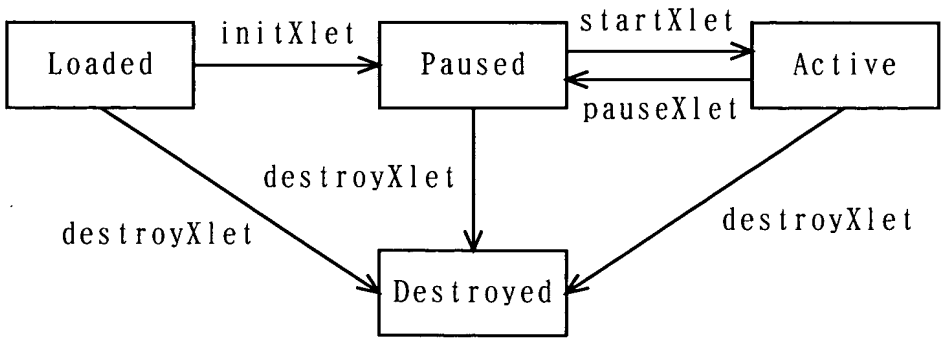

FIG. 48

AID	CONTROL INFORMATION	APPLN NAME	APPLN PRIORITY LEVEL
1	kill	EPG	64
2	present	CARD GAME	32

FIG. 49

STATE OF THE APPLICATION	STATE OF THE Java MIDDLEWARE
AT LEAST ONE APPLICATION IS IN THE "Active" STATE	DURING EXECUTION
NO APPLICATION IS IN THE "Active" STATE AND AT LEAST ONE APPLICATION IS IN THE "Paused" STATE	AT A PAUSE
OTHER THAN THE ABOVE	AT A STOP

FIG. 50

STATE OF THE APPLICATION	STATE DEFINED BY THE COMBINING SECTION
Active	DURING EXECUTION
Paused	AT A PAUSE
OTHER THAN THE ABOVE	AT A STOP

FIG. 51

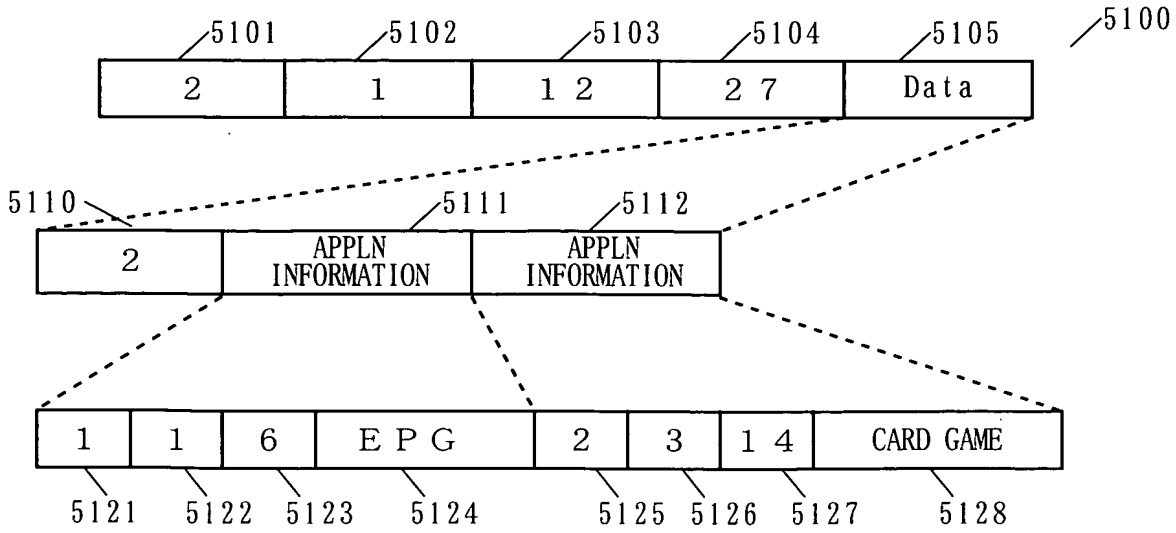

FIG. 52

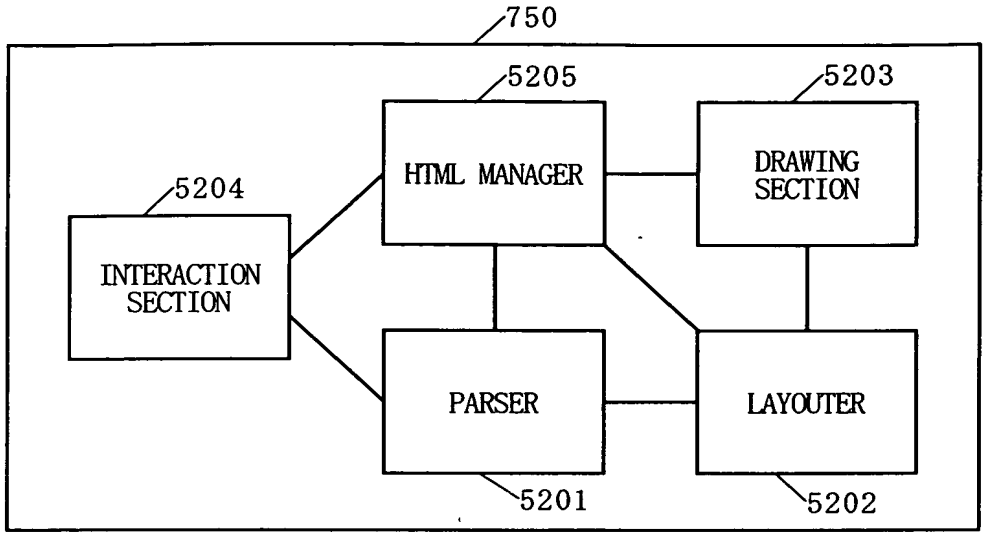
750
5205
5203
HTML MANAGER
DRAWING SECTION
5204
INTERACTION SECTION
PARSER
LAYOUTER
5201
5202

FIG. 53

```
<?xml version="1.0"?>
<!DOCTYPE html PUBLIC "-//DVB//DTD XHTML DVB-
HTML 1.0//EN"
"http://www.dvb.org/mhp/dtd/dvbhtml-1-0.dtd">
<html xmlns="http://www.w3c.org/1999/xhtml">
<head>
<link rel="stylesheet" href="sampleCSS.css" type="text/css">
</head>
<body id="body">                                          5311
<H1>:INTRODUCE WEATHER FORECAST SERVICES OF VARIOUS COUNTRIES </H1>
<a class="param1" href="dvb://1.2.1/Japan_Weather.html">
Japan</a>                                                 5312
<br></br>
<a class="param2" href="dvb://1.2.2/USA_Weather.html">
USA</a>                                                   5313
<br></br>
<a class="param3"                                         5314
href="dvb://1.2.3/Germany_Weather.html">
Germany</a>
</body>
</html>
```

FIG. 54

```
H1{position:absolute;top:50px;left:50px;}
a.param1{position:absolute;top:200px;left:100px;}
a.param2{position:absolute;top:300px;left:100px;}
a.param3{position:absolute;top:400px;left:100px;}
```

FIG. 55

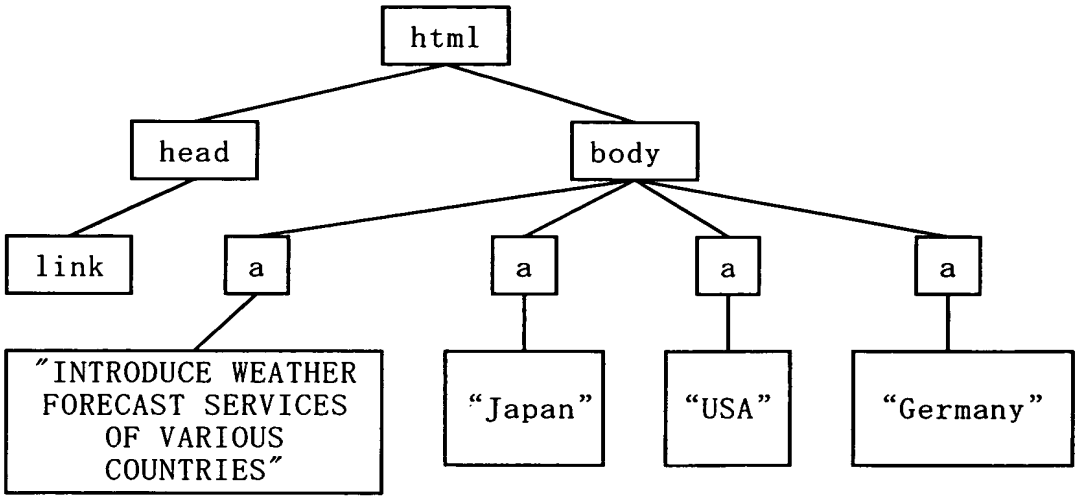
html
head
body
link
a
a
a
a
"INTRODUCE WEATHER FORECAST SERVICES OF VARIOUS COUNTRIES"
"Japan"
"USA"
"Germany"

FIG. 56

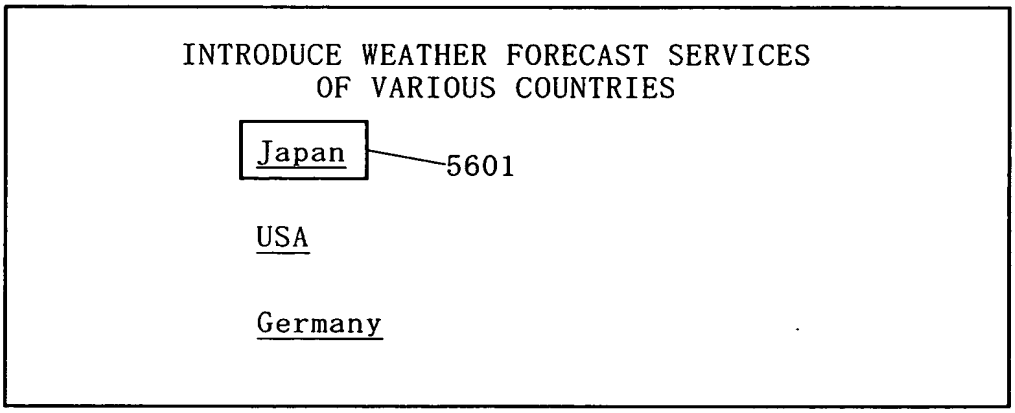
INTRODUCE WEATHER FORECAST SERVICES OF VARIOUS COUNTRIES
Japan
5601
USA
Germany

FIG. 57

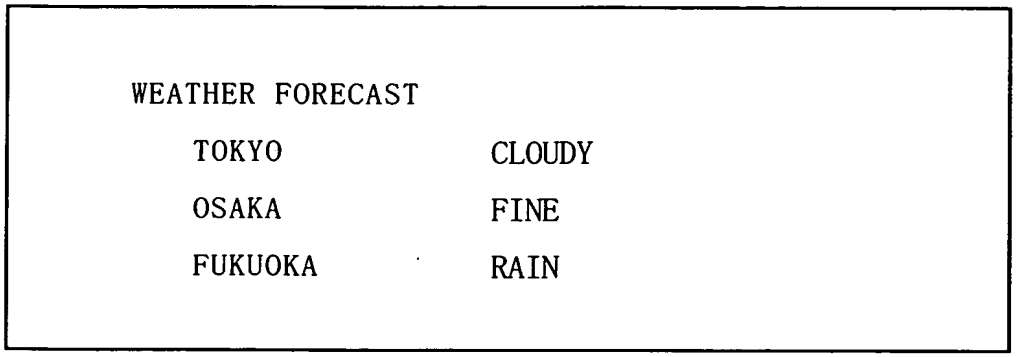

FIG. 58

```
<?xml version="1.0"?>
<!DOCTYPE html PUBLIC "-//DVB//DTD XHTML DVB-HTML
1.0//EN"
"http://www.dvb.org/mhp/dtd/dvbhtml-1-0.dtd">
<html xmlns="http://www.w3c.org/1999/xhtml">
<head>
<script type="text/javascript">                    5801
 <!--
  function ChangeDOMTree(){
  ...
  }
 //-->
 </script>
</head>
<body>
 <table>
  <tr>
     <td> SEA </td>
  </tr>
  <tr>
     <td> MOUNTAIN </td>
  </tr>
 </table>                                          5802
 <form>
  <input type="button" value="DETAILED INFORMATION"
   onclick= ChangeDOMTree() >
  </input>
 </form>
</body>
<html>
```

FIG. 59

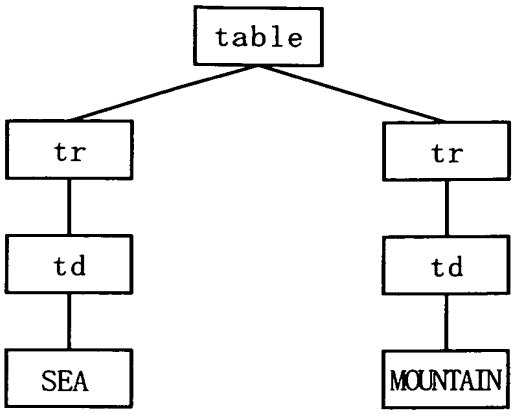
table
tr
tr
td
td
SEA
MOUNTAIN

FIG. 60

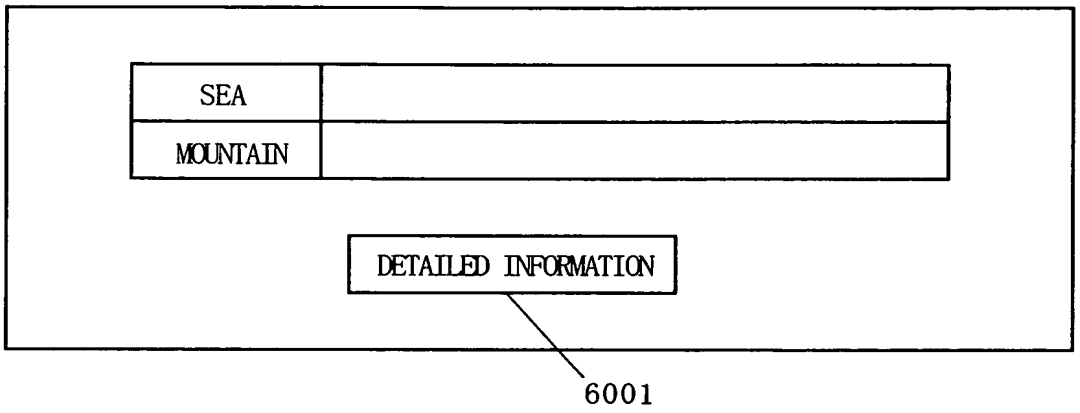
SEA
MOUNTAIN
DETAILED INFORMATION
6001

FIG. 61

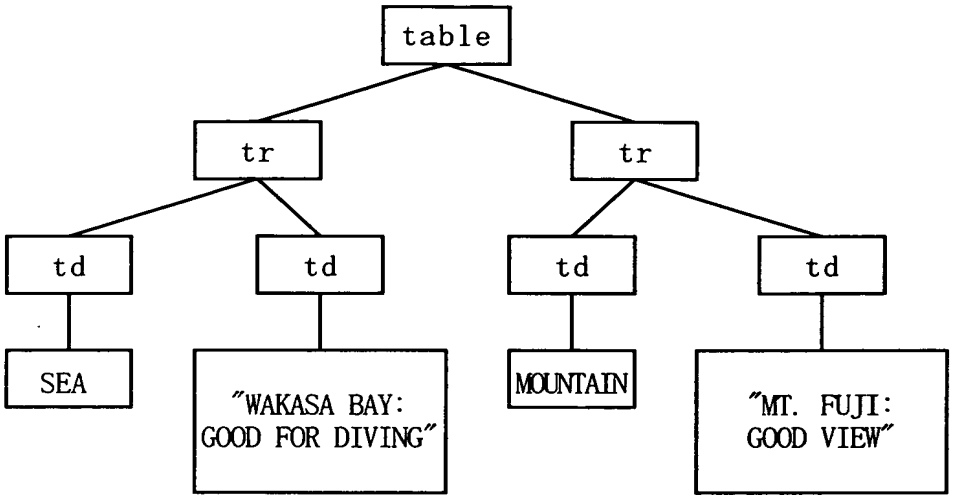
table
tr
tr
td
td
td
td
SEA
"WAKASA BAY:
GOOD FOR DIVING"
MOUNTAIN
"MT. FUJI:
GOOD VIEW"

FIG. 62

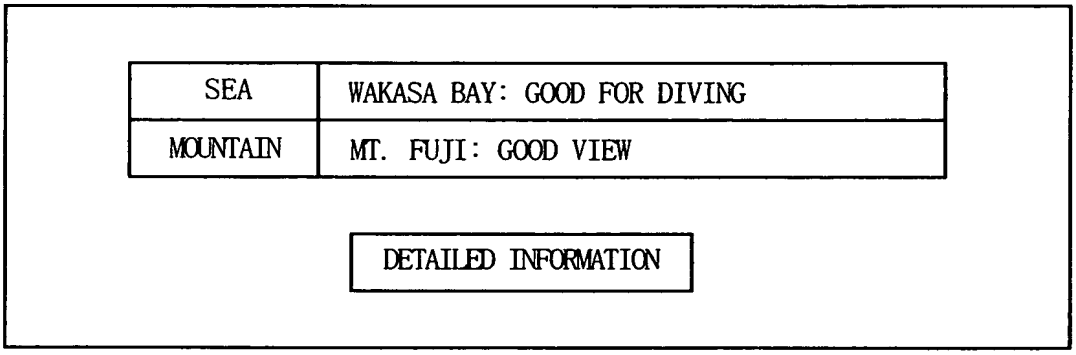
SEA
WAKASA BAY: GOOD FOR DIVING
MOUNTAIN
MT. FUJI: GOOD VIEW
DETAILED INFORMATION

FIG. 63

DATA ID	CONTROL INFORMATION	DATA NAME	APPLN PRIORITY LEVEL
1	autostart	WEATHER FORECAST	5 4
2	present	HOLIDAY OUTING INFORMATION	2 2

FIG. 64

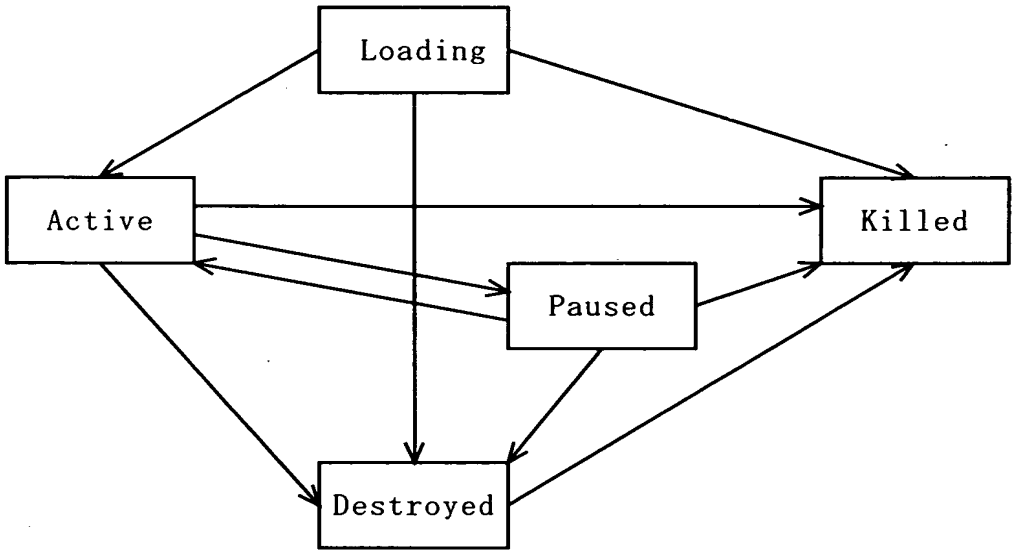

FIG. 65

DATA ID	CONTROL INFORMATION	DATA NAME	APPLN PRIORITY LEVEL
1	kill	WEATHER FORECAST	5 4
2	present	HOLIDAY OUTING INFORMATION	2 2

FIG. 66

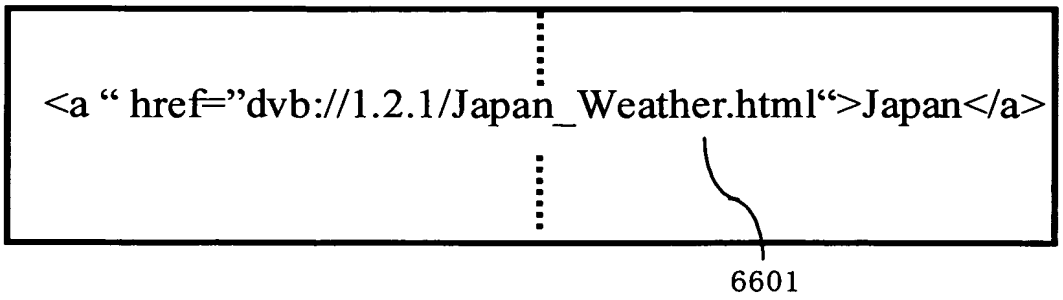

FIG. 67

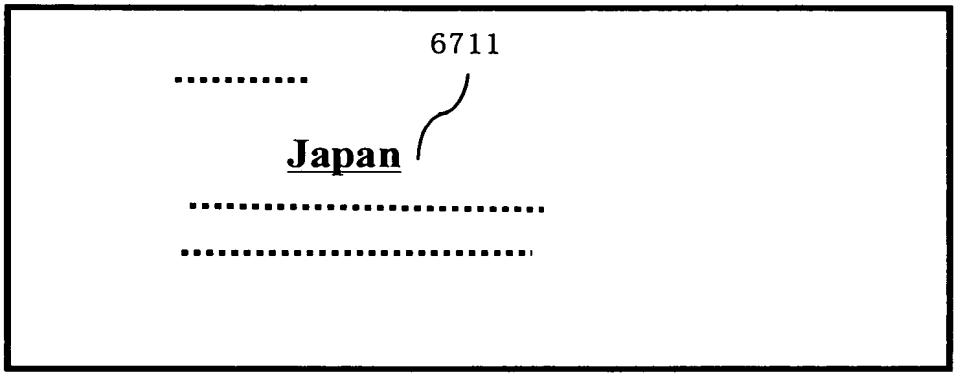

FIG. 68

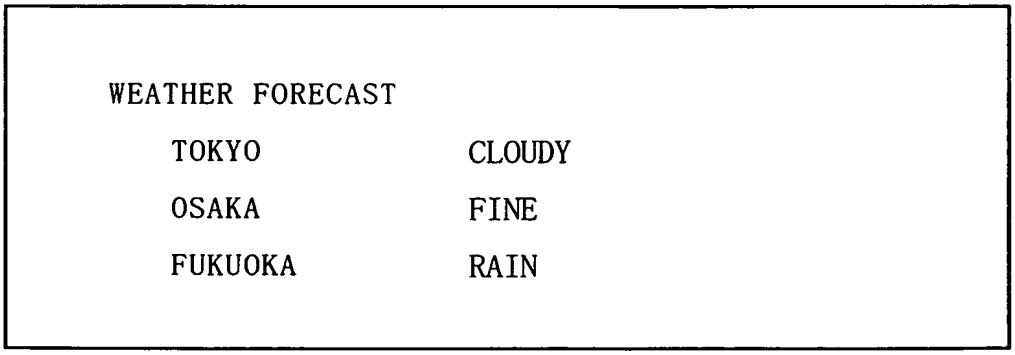

FIG. 69

STATE OF THE HTML DATA	STATE OF THE HTML BROWSER
AT LEAST ONE HTML DATA IS IN THE "Active" STATE	DURING EXECUTION
NO HTML DATA IS IN THE "Active" STATE AND AT LEAST ONE HTML DATA IS IN THE "Paused" STATE	AT A PAUSE
OTHER THAN THE ABOVE	AT A STOP

FIG. 70

STATE OF THE HTML DATA	STATE DEFINED BY THE COMBINING SECTION
Active	DURING EXECUTION
Paused	AT A PAUSE
OTHER THAN THE ABOVE	AT A STOP

FIG. 71

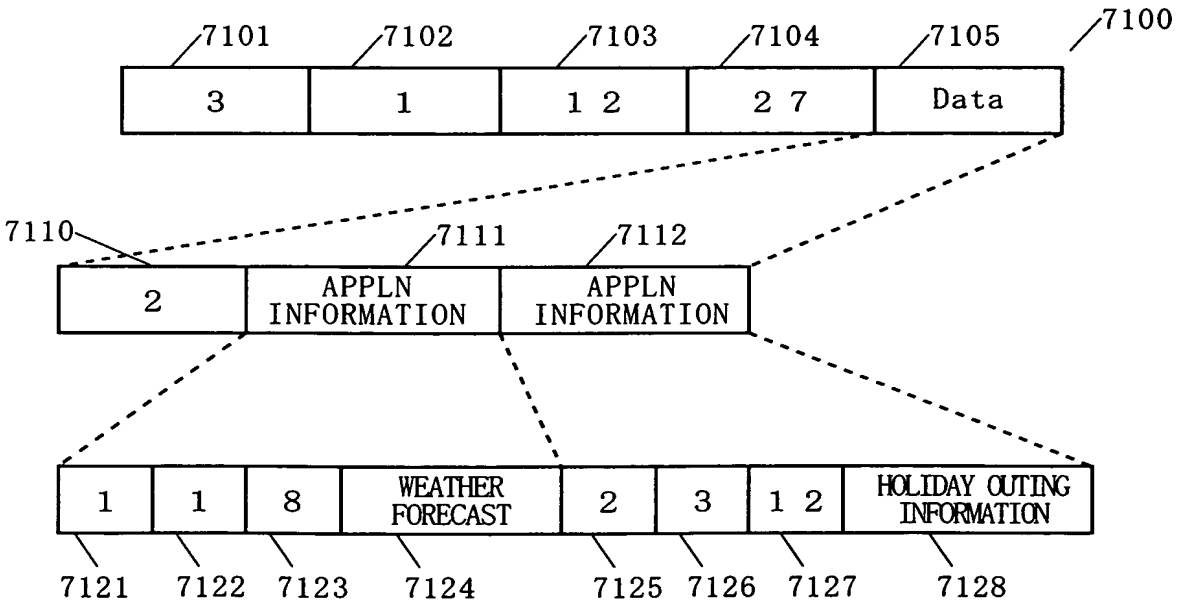

FIG. 72

STATE OF THE MAILER	STATE DEFINED BY THE COMBINING SECTION
ACTIVE	DURING EXECUTION
AT A STOP	AT A STOP

FIG. 73

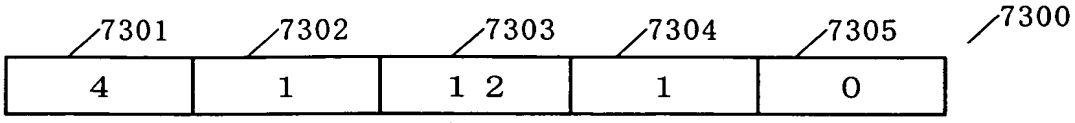

FIG. 74

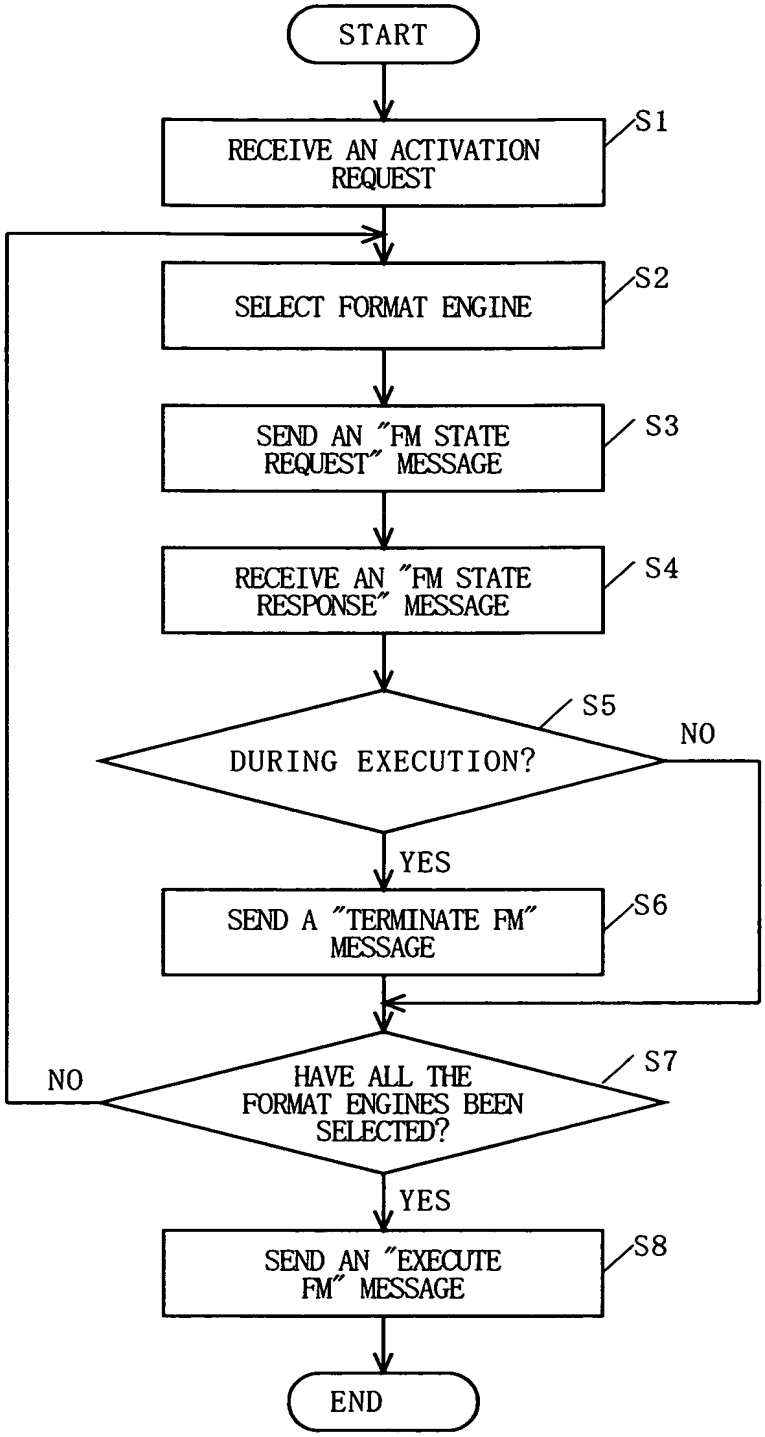
START
RECEIVE AN ACTIVATION REQUEST
S1
SELECT FORMAT ENGINE
S2
SEND AN "FM STATE REQUEST" MESSAGE
S3
RECEIVE AN "FM STATE RESPONSE" MESSAGE
S4
DURING EXECUTION?
S5
NO
YES
SEND A "TERMINATE FM" MESSAGE
S6
HAVE ALL THE FORMAT ENGINES BEEN SELECTED?
S7
NO
YES
SEND AN "EXECUTE FM" MESSAGE
S8
END

FIG. 75

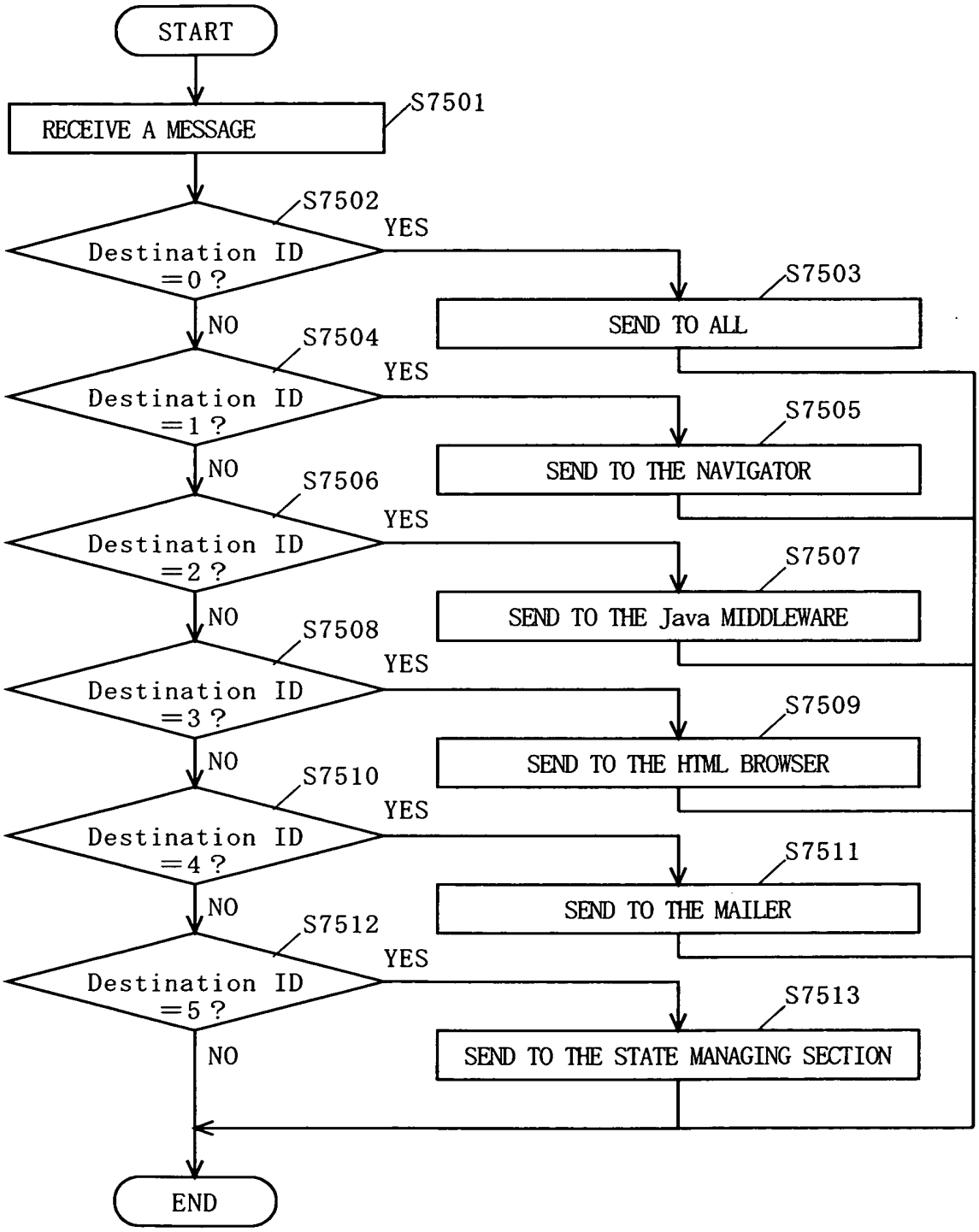
START
RECEIVE A MESSAGE
S7501
S7502
Destination ID =0 ?
YES
S7503
SEND TO ALL
NO
S7504
Destination ID =1 ?
YES
S7505
SEND TO THE NAVIGATOR
NO
S7506
Destination ID =2 ?
YES
S7507
SEND TO THE Java MIDDLEWARE
NO
S7508
Destination ID =3 ?
YES
S7509
SEND TO THE HTML BROWSER
NO
S7510
Destination ID =4 ?
YES
S7511
SEND TO THE MAILER
NO
S7512
Destination ID =5 ?
YES
S7513
SEND TO THE STATE MANAGING SECTION
NO
END

FIG. 76

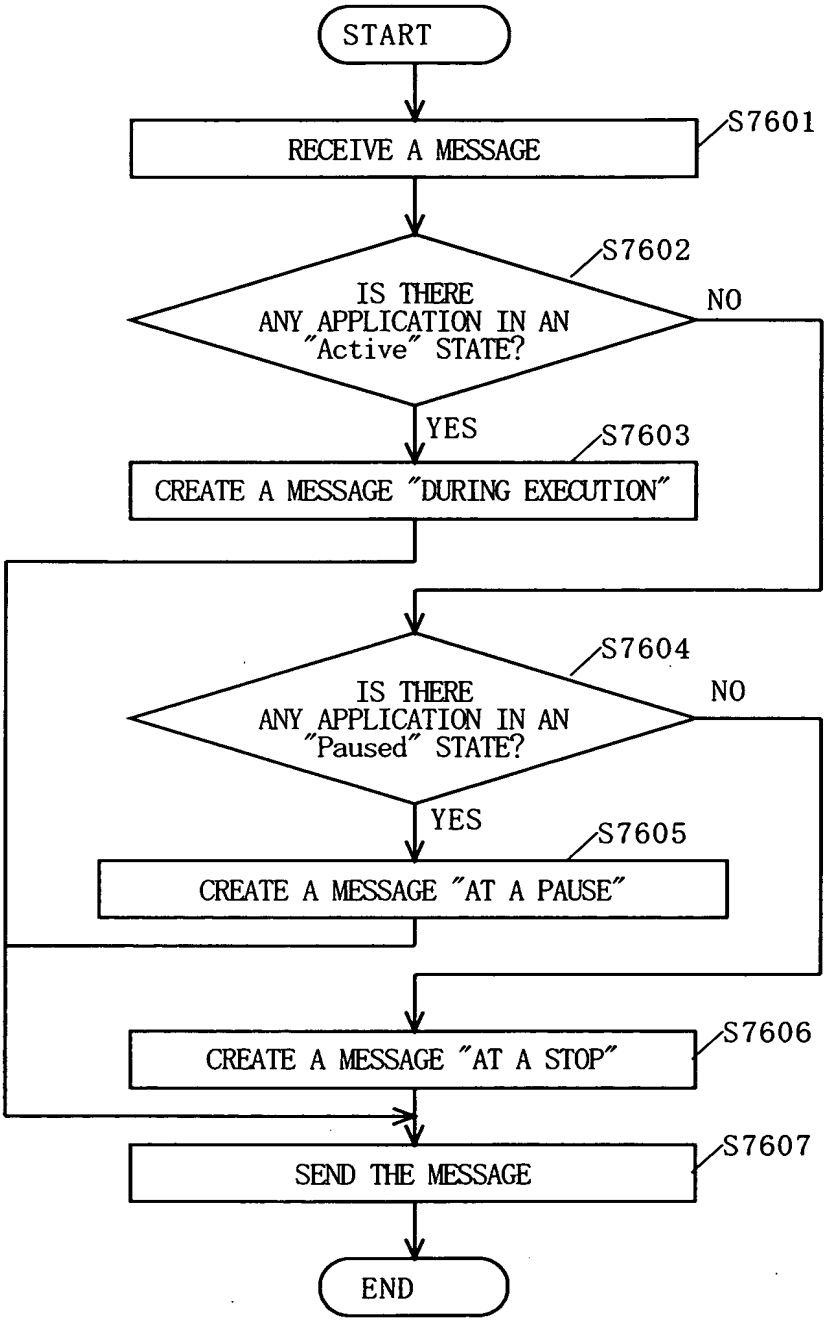
START
RECEIVE A MESSAGE
S7601
S7602
IS THERE ANY APPLICATION IN AN "Active" STATE?
NO
YES
S7603
CREATE A MESSAGE "DURING EXECUTION"
S7604
IS THERE ANY APPLICATION IN AN "Paused" STATE?
NO
YES
S7605
CREATE A MESSAGE "AT A PAUSE"
CREATE A MESSAGE "AT A STOP"
S7606
SEND THE MESSAGE
S7607
END

FIG. 77

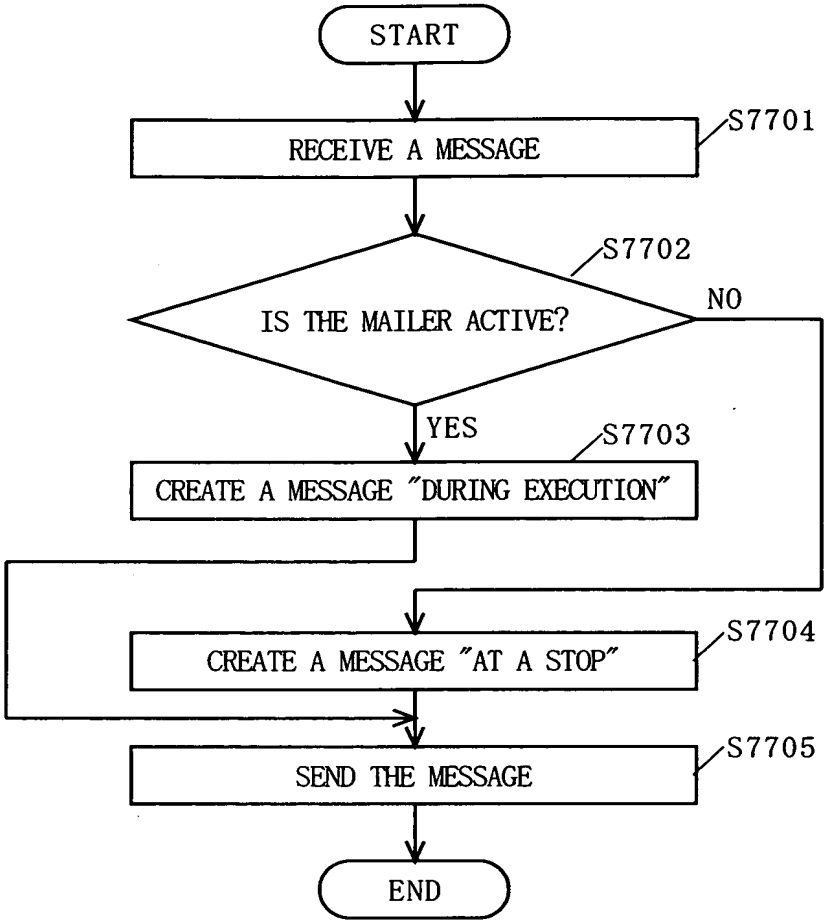
START
RECEIVE A MESSAGE
S7701
S7702
IS THE MAILER ACTIVE?
NO
YES
S7703
CREATE A MESSAGE "DURING EXECUTION"
CREATE A MESSAGE "AT A STOP"
S7704
SEND THE MESSAGE
S7705
END

FIG. 78

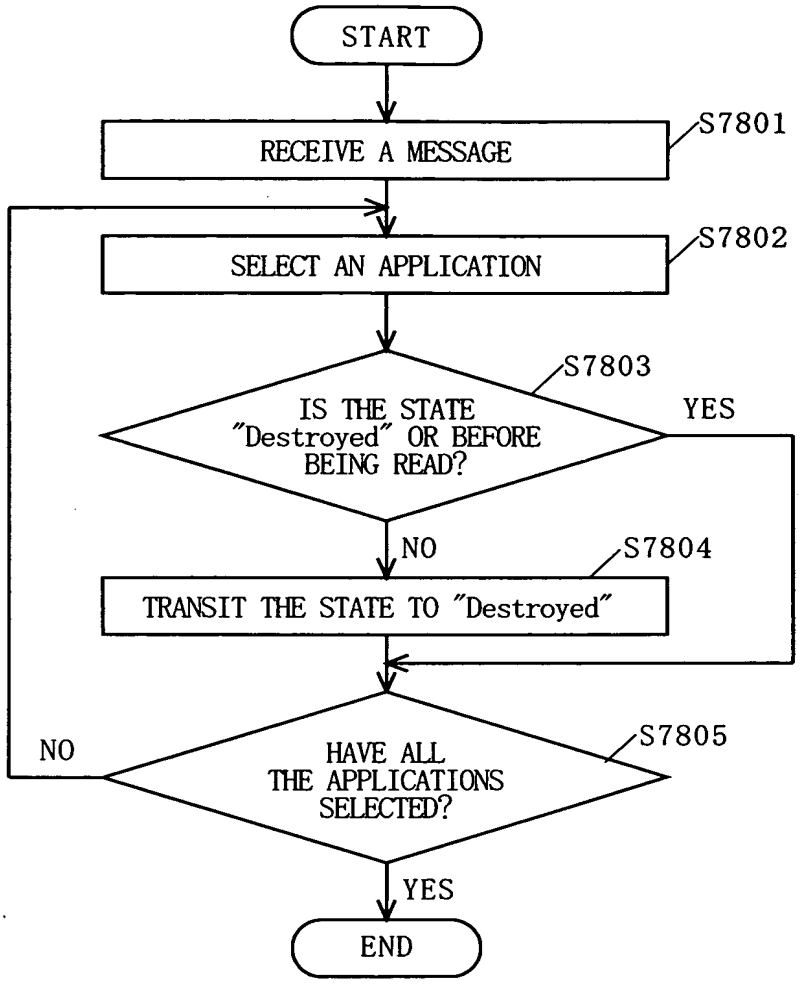
START
RECEIVE A MESSAGE
S7801
SELECT AN APPLICATION
S7802
S7803
IS THE STATE "Destroyed" OR BEFORE BEING READ?
YES
NO
S7804
TRANSIT THE STATE TO "Destroyed"
S7805
NO
HAVE ALL THE APPLICATIONS SELECTED?
YES
END

FIG. 79

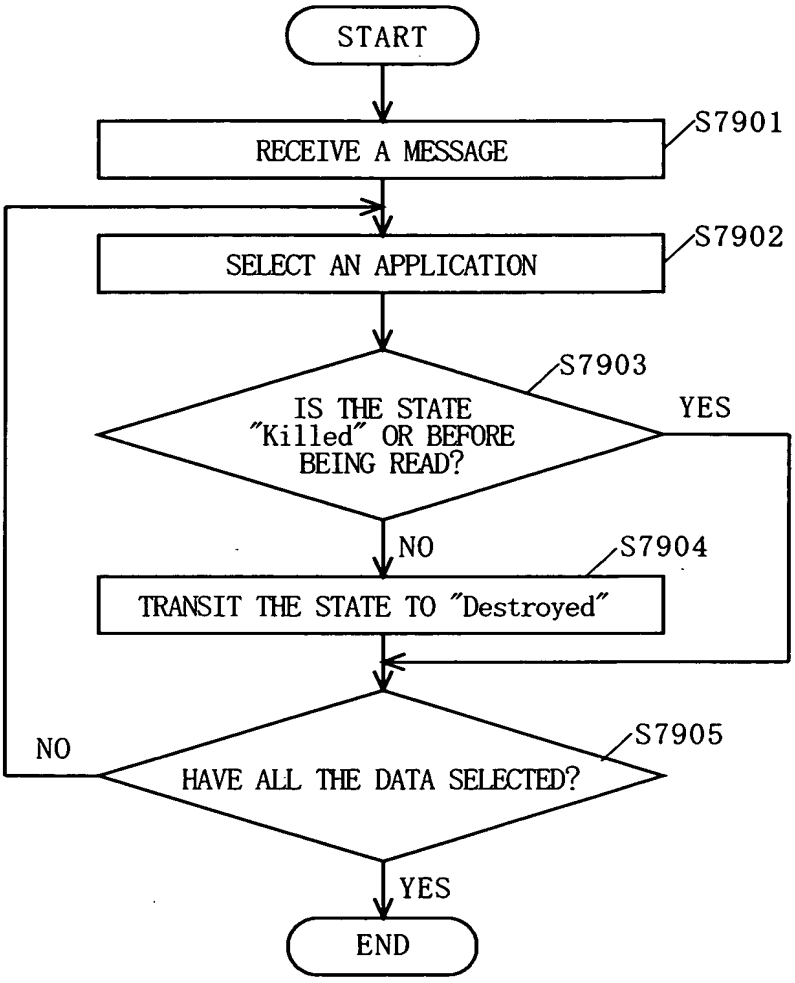
START
RECEIVE A MESSAGE
S7901
SELECT AN APPLICATION
S7902
IS THE STATE "Killed" OR BEFORE BEING READ?
S7903
YES
NO
TRANSIT THE STATE TO "Destroyed"
S7904
HAVE ALL THE DATA SELECTED?
S7905
NO
YES
END

FIG. 80

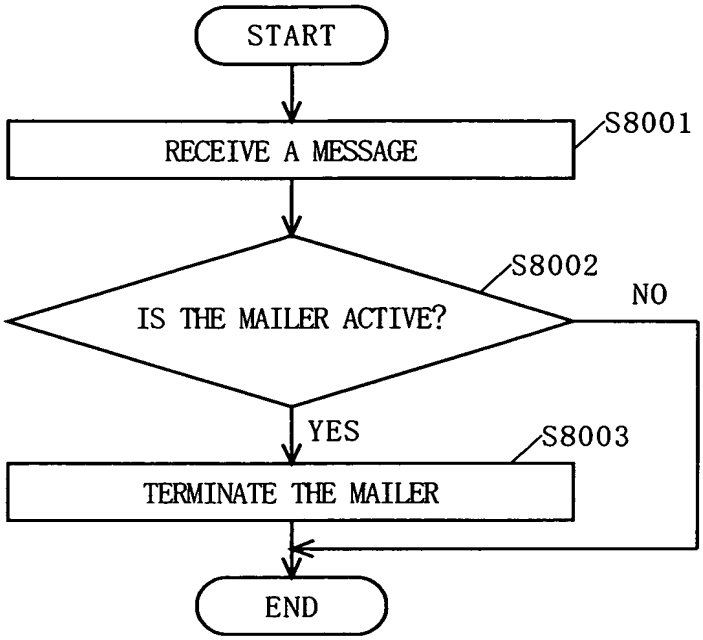
START
RECEIVE A MESSAGE
S8001
IS THE MAILER ACTIVE?
S8002
NO
YES
TERMINATE THE MAILER
S8003
END

FIG. 81

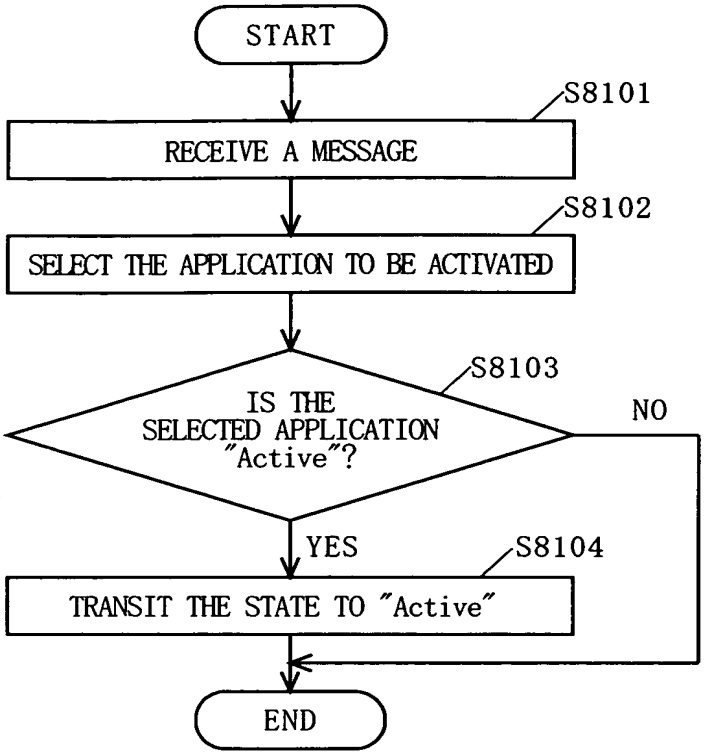
START
S8101
RECEIVE A MESSAGE
S8102
SELECT THE APPLICATION TO BE ACTIVATED
S8103
IS THE SELECTED APPLICATION "Active"?
NO
YES
S8104
TRANSIT THE STATE TO "Active"
END

FIG. 82

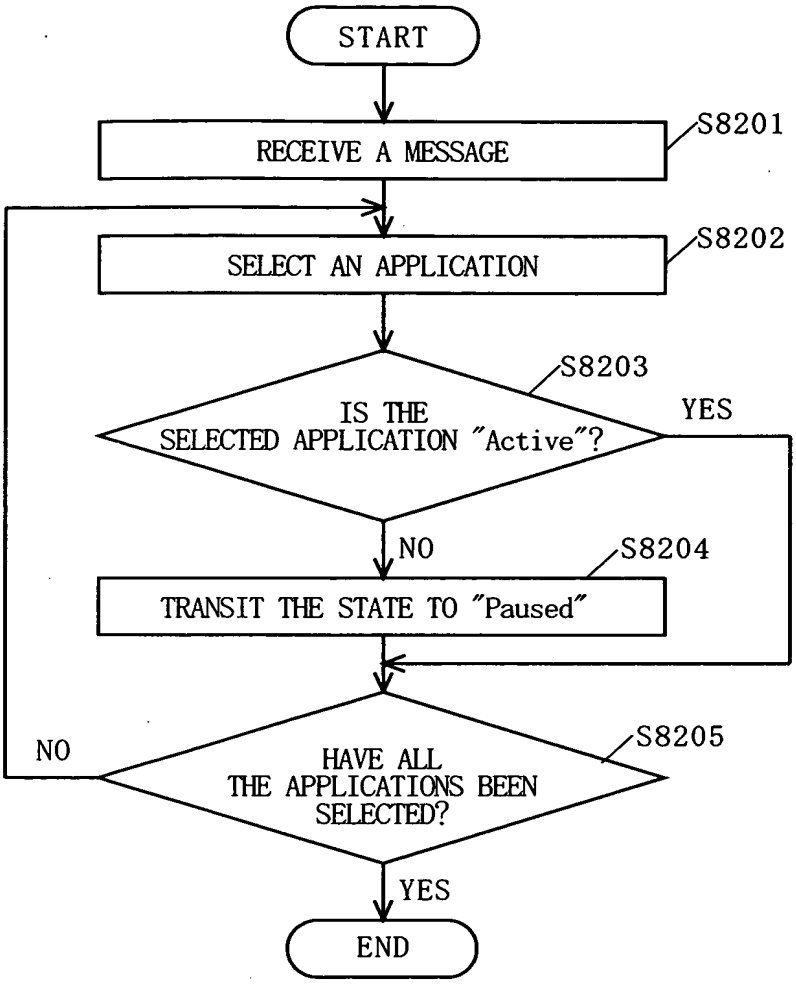
START
RECEIVE A MESSAGE
S8201
SELECT AN APPLICATION
S8202
IS THE SELECTED APPLICATION "Active"?
S8203
YES
NO
S8204
TRANSIT THE STATE TO "Paused"
HAVE ALL THE APPLICATIONS BEEN SELECTED?
S8205
NO
YES
END

FIG. 83

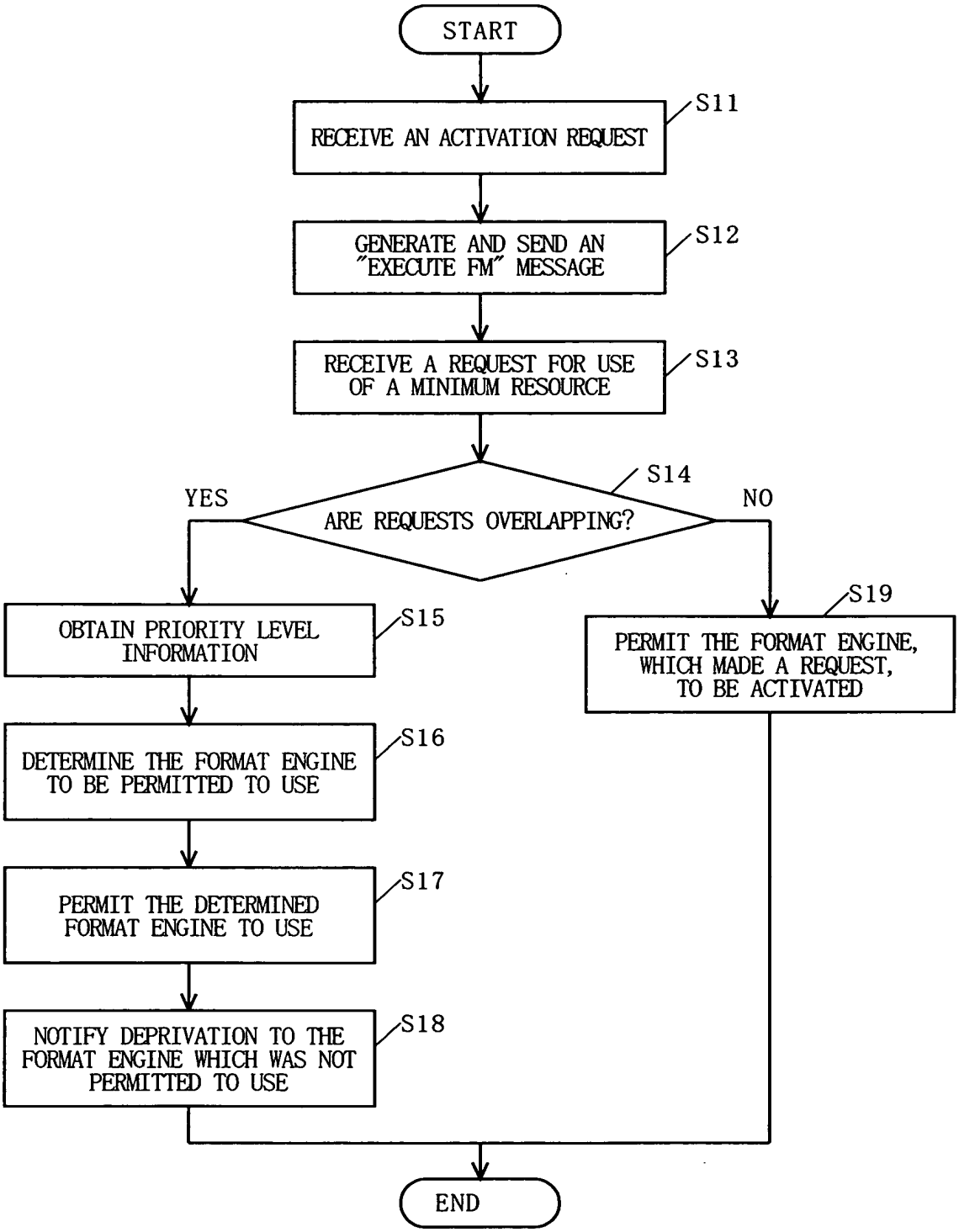
START
RECEIVE AN ACTIVATION REQUEST
S11
GENERATE AND SEND AN "EXECUTE FM" MESSAGE
S12
RECEIVE A REQUEST FOR USE OF A MINIMUM RESOURCE
S13
ARE REQUESTS OVERLAPPING?
S14
YES
NO
OBTAIN PRIORITY LEVEL INFORMATION
S15
DETERMINE THE FORMAT ENGINE TO BE PERMITTED TO USE
S16
PERMIT THE DETERMINED FORMAT ENGINE TO USE
S17
NOTIFY DEPRIVATION TO THE FORMAT ENGINE WHICH WAS NOT PERMITTED TO USE
S18
PERMIT THE FORMAT ENGINE, WHICH MADE A REQUEST, TO BE ACTIVATED
S19
END

FIG. 84

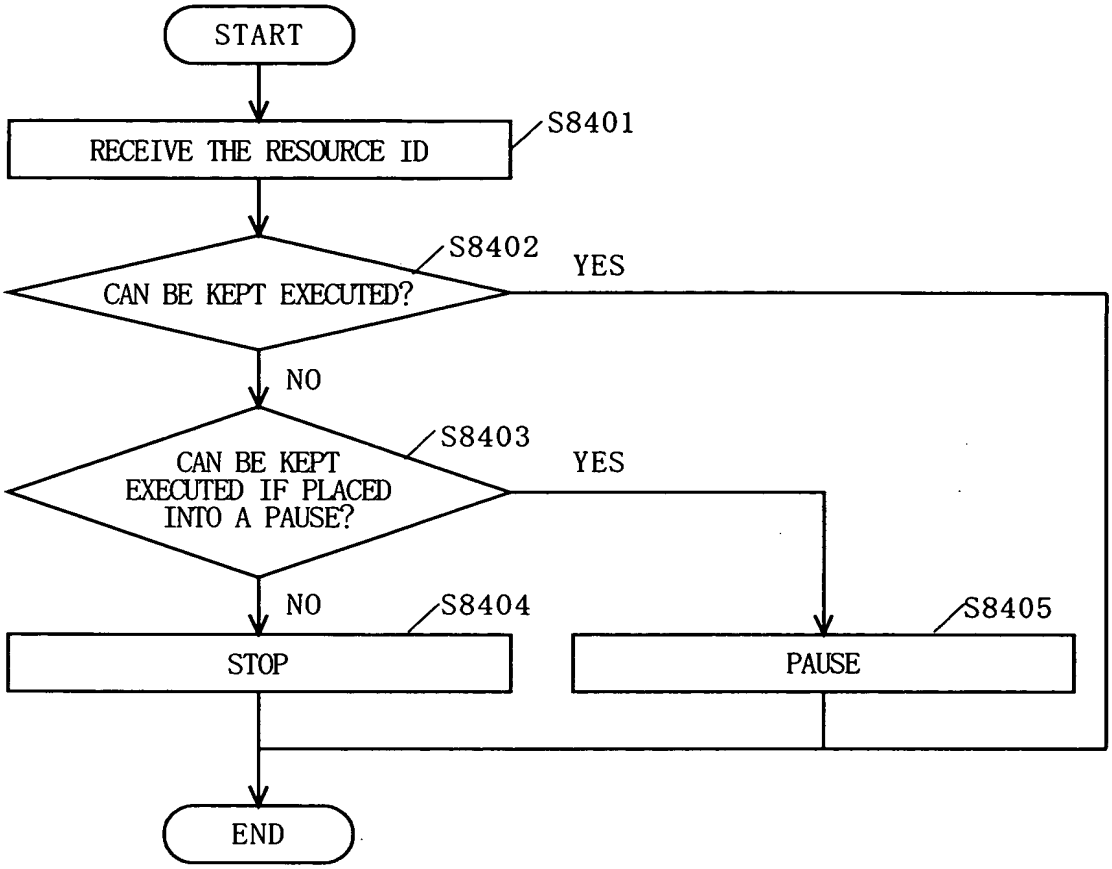
START
RECEIVE THE RESOURCE ID
S8401
CAN BE KEPT EXECUTED?
S8402
YES
NO
CAN BE KEPT EXECUTED IF PLACED INTO A PAUSE?
S8403
YES
NO
S8404
S8405
STOP
PAUSE
END

FIG. 85

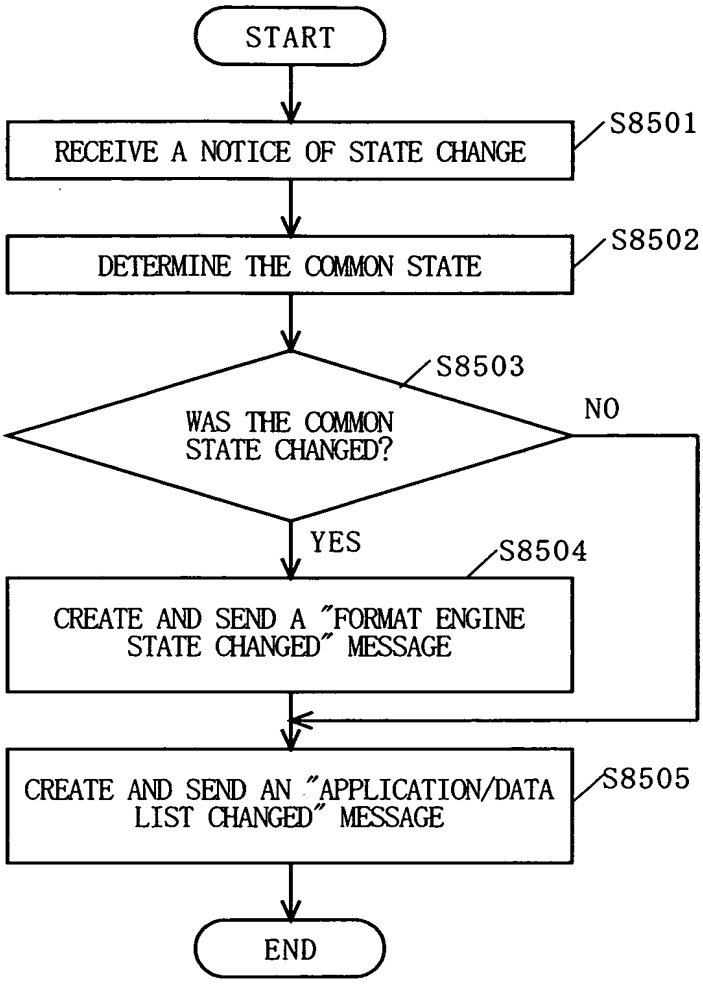
START
RECEIVE A NOTICE OF STATE CHANGE
S8501
DETERMINE THE COMMON STATE
S8502
WAS THE COMMON STATE CHANGED?
S8503
NO
YES
CREATE AND SEND A "FORMAT ENGINE STATE CHANGED" MESSAGE
S8504
CREATE AND SEND AN "APPLICATION/DATA LIST CHANGED" MESSAGE
S8505
END

FIG. 86

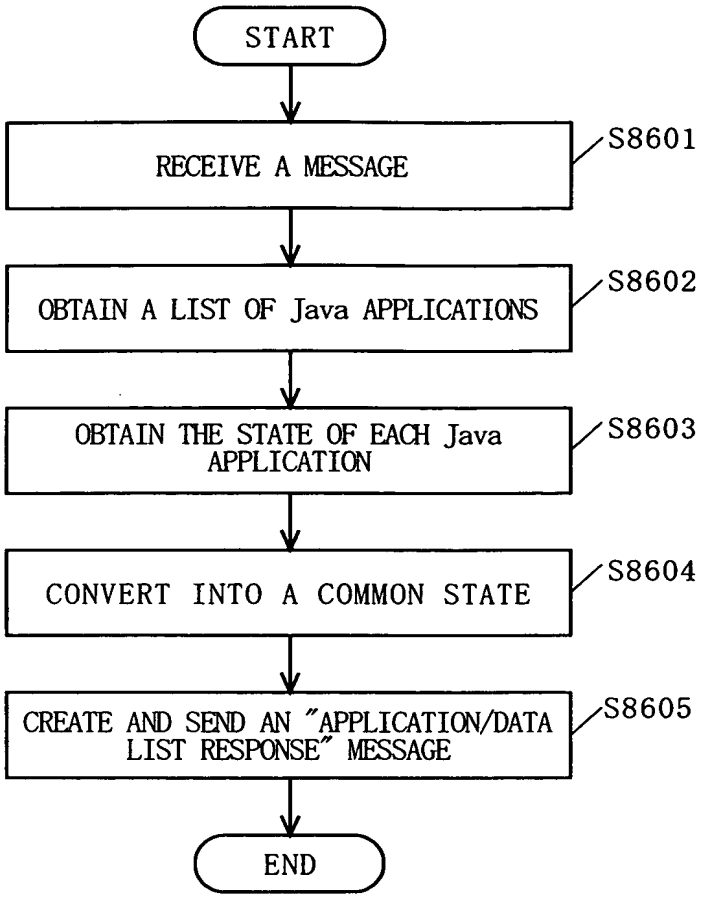
START
RECEIVE A MESSAGE
S8601
OBTAIN A LIST OF Java APPLICATIONS
S8602
OBTAIN THE STATE OF EACH Java APPLICATION
S8603
CONVERT INTO A COMMON STATE
S8604
CREATE AND SEND AN "APPLICATION/DATA LIST RESPONSE" MESSAGE
S8605
END

FIG. 87

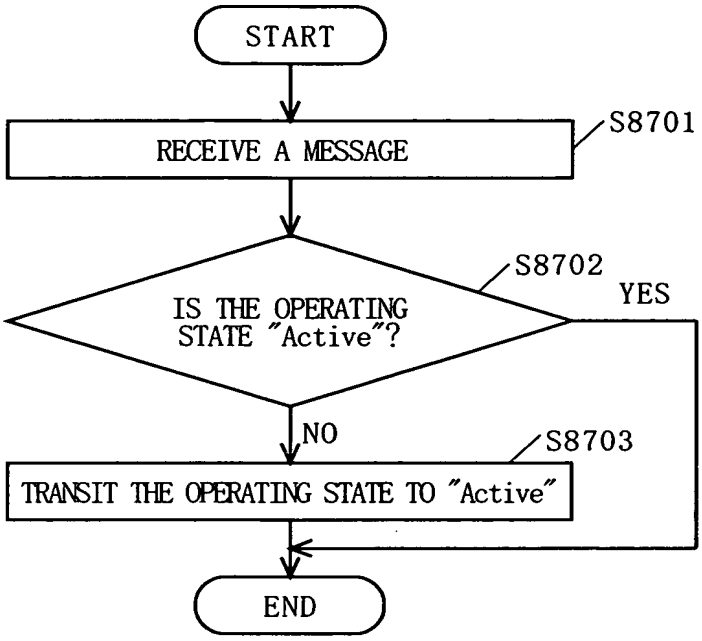
START
RECEIVE A MESSAGE
S8701
IS THE OPERATING STATE "Active"?
S8702
YES
NO
TRANSIT THE OPERATING STATE TO "Active"
S8703
END

FIG. 88

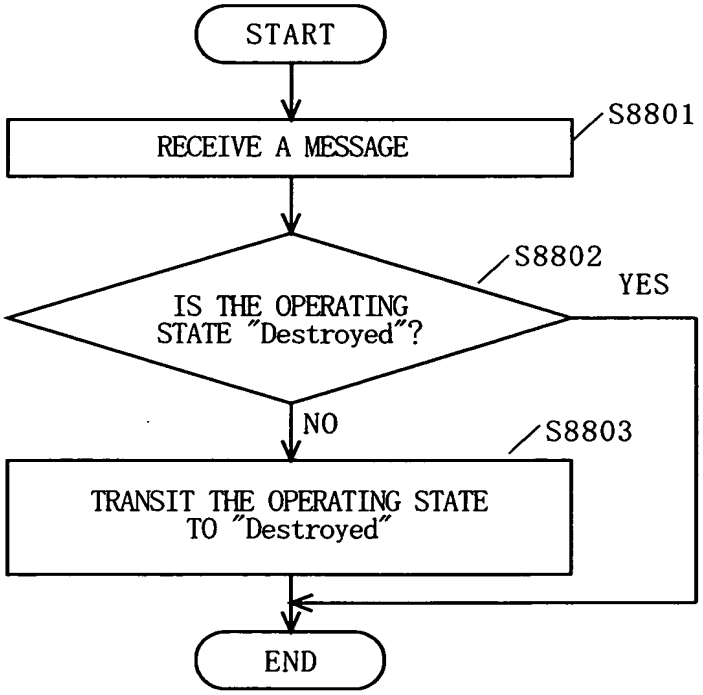
START
RECEIVE A MESSAGE
S8801
IS THE OPERATING STATE "Destroyed"?
S8802
YES
NO
TRANSIT THE OPERATING STATE TO "Destroyed"
S8803
END

FIG. 89

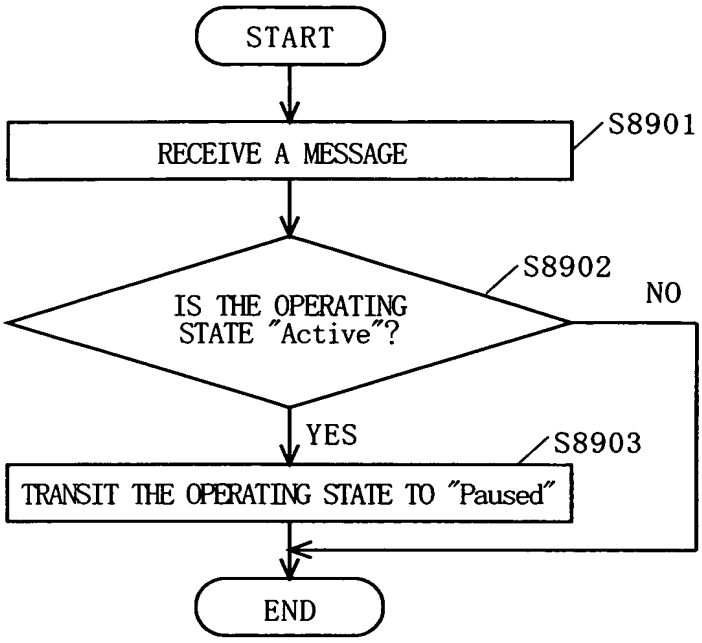
START
RECEIVE A MESSAGE
S8901
IS THE OPERATING STATE "Active"?
S8902
NO
YES
TRANSIT THE OPERATING STATE TO "Paused"
S8903
END

FIG. 90

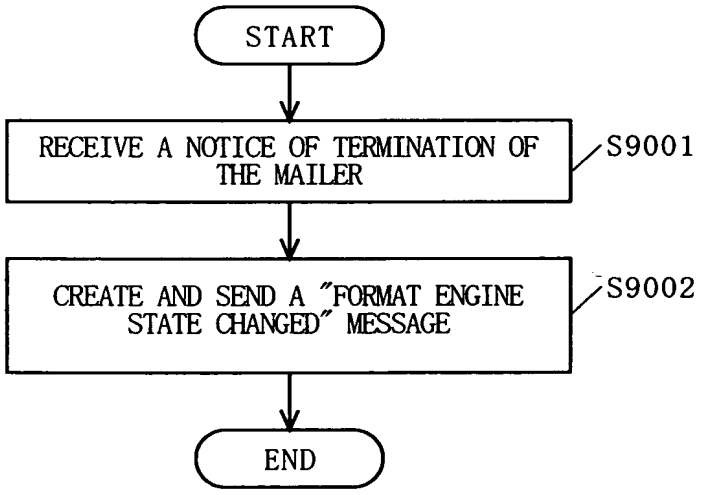
START
RECEIVE A NOTICE OF TERMINATION OF THE MAILER
S9001
CREATE AND SEND A "FORMAT ENGINE STATE CHANGED" MESSAGE
S9002
END

FIG. 91

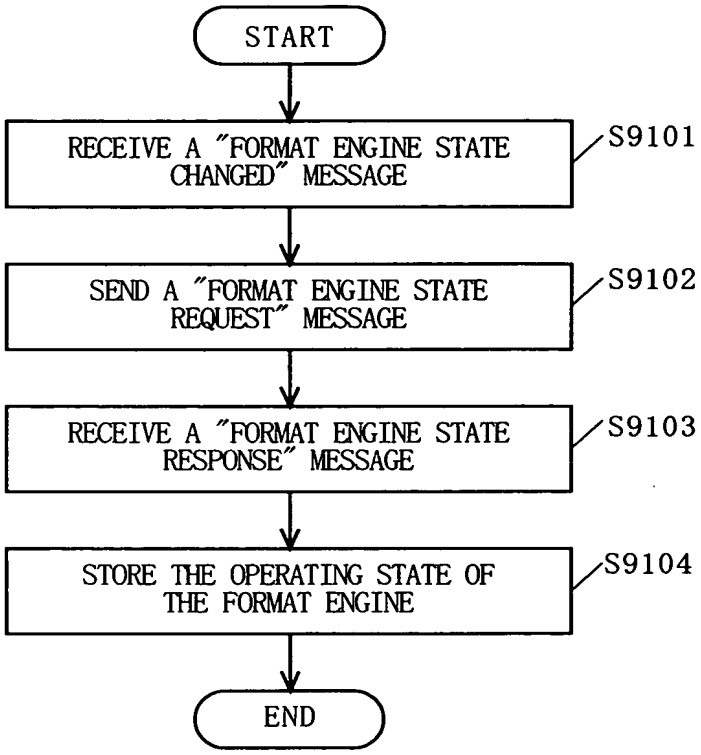
START
RECEIVE A "FORMAT ENGINE STATE CHANGED" MESSAGE
S9101
SEND A "FORMAT ENGINE STATE REQUEST" MESSAGE
S9102
RECEIVE A "FORMAT ENGINE STATE RESPONSE" MESSAGE
S9103
STORE THE OPERATING STATE OF THE FORMAT ENGINE
S9104
END

FIG. 92

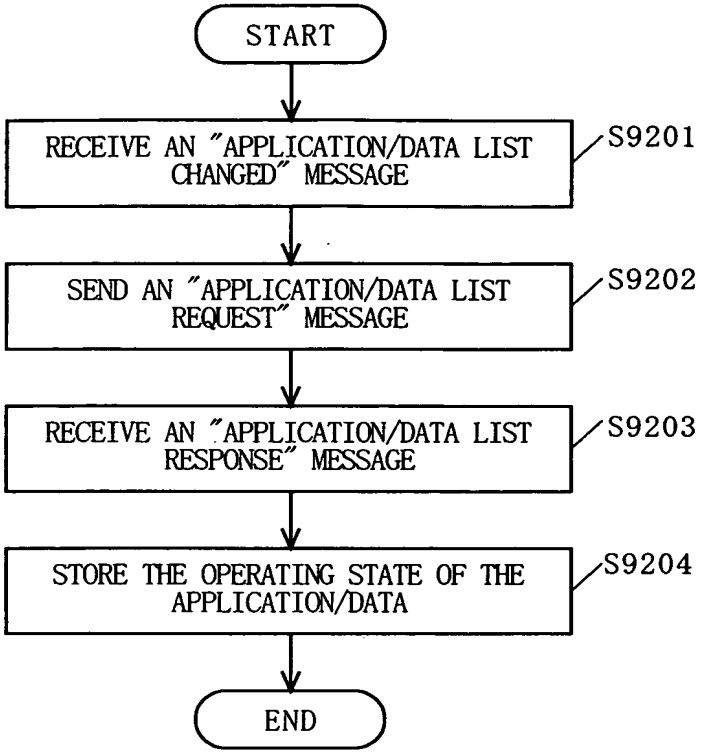
START
RECEIVE AN "APPLICATION/DATA LIST CHANGED" MESSAGE
S9201
SEND AN "APPLICATION/DATA LIST REQUEST" MESSAGE
S9202
RECEIVE AN "APPLICATION/DATA LIST RESPONSE" MESSAGE
S9203
STORE THE OPERATING STATE OF THE APPLICATION/DATA
S9204
END

FIG. 93

Java MIDDLEWARE	HTML BROWSER	MAILER
AT A STOP	AT A STOP	AT A STOP
AT A PAUSE	AT A STOP	AT A STOP
AT A STOP	AT A PAUSE	AT A STOP
AT A PAUSE	AT A PAUSE	AT A STOP

FIG. 94 PRIOR ART

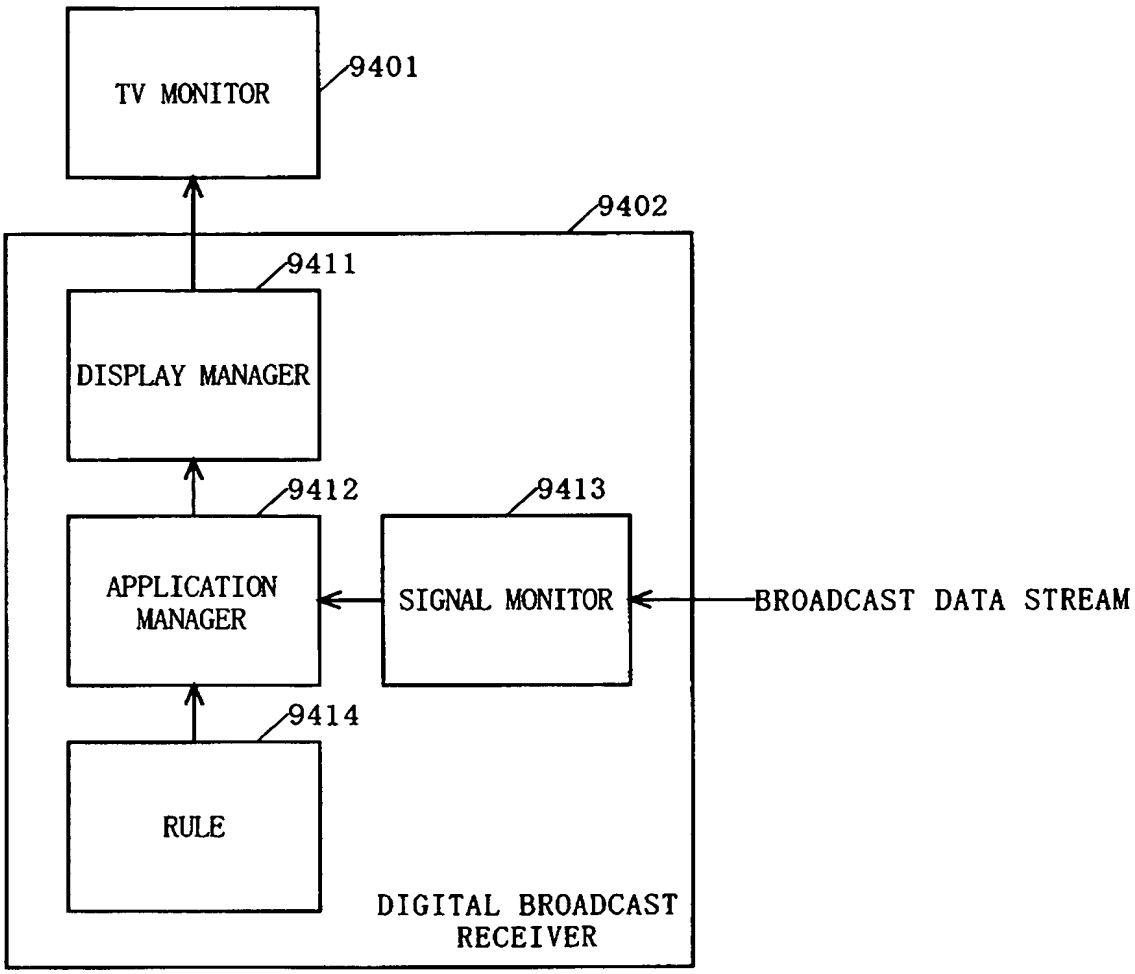
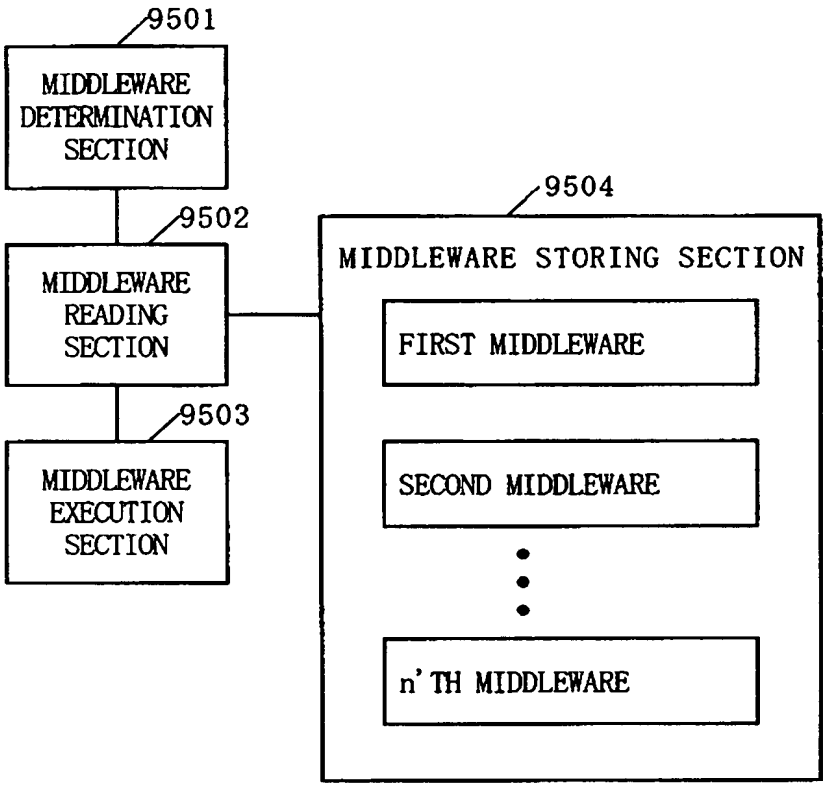
FIG. 95 PRIOR ART